Docket file

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 22, 1993

Docket No. 50-443
Serial No. SEA-93-027

Mr. Ted C. Feigenbaum
Senior Vice President
and Chief Nuclear Officer
North Atlantic Energy Service Corporation
Post Office Box 300
Seabrook, New Hampshire 03874

Dear Mr. Feigenbaum:

SUBJECT: AMENDMENT NO. 27 TO FACILITY OPERATING LICENSE NPF-86: INCORE DETECTOR SYSTEM - LICENSE AMENDMENT REQUEST 92-14 (TAC M85020)

The Commission has issued the enclosed Amendment No. 27 to Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1, in response to your application dated November 25, 1992, as supplemented by letters dated July 2, 1993, and November 24, 1993.

The amendment revises the Appendix A Technical Specifications (TS) with regard to the requirement to use the movable incore detectors to perform certain measurements. The amendment modifies the TS to allow the fixed incore detectors to be utilized in addition to the movable incore detectors to perform TS surveillances. The amendment modifies TS Sections 3.1.3, 4.2.2, 4.2.3, 4.2.4, and 3.3.3.

While we have approved the requested changes to the TS, the approval is conditioned upon North Atlantic implementing the following commitments:

1. For the remainder of the current Cycle 3 operation, North Atlantic will acquire at least one additional core flux map with the movable incore detector system within the burnup window of end-of-life (EOL) as defined in the Cycle 3 Nuclear Design Report. Eleven Cycle 3 core flux maps have been taken to date with the movable incore detector system.

2. During Cycle 4 operation, North Atlantic will acquire additional core flux map data from the movable incore detector system. At least three core flux maps will be taken with the movable incore detector system, one within each burnup window of beginning-of-life (BOL), middle-of-life (MOL) and EOL as defined in the Cycle 4 Nuclear Design Report.

3. Following completion of Cycle 4 operation, North Atlantic will submit to the NRC a report showing comparison of the fixed and movable incore detector flux map results (Fq, Fxy and FΔh) comparing Cycle 3 and

Cycle 4 with the YAEC-1855P values. If the Cycle 3 and Cycle 4 comparisons continue to demonstrate consistency with the results previously provided to the NRC for Cycle 1 and Cycle 2, then the NRC will no longer require further confirmatory movable incore detector flux map data.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance willbe included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by:

Albert W. De Agazio, Sr. Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 27 to NPF-86
2. Safety Evaluation

cc w/enclosures:
See next page

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*See previous concurrence

OFFICE	LA:PDI-4	PM:PDI-4	D:PDI-4*	OGC	
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Cycle 4 with the YAEC-1855P values. If the Cycle 3 and Cycle 4 comparisons continue to demonstrate consistency with the results previously provided to the NRC for Cycle 1 and Cycle 2, then the NRC will no longer require further confirmatory movable incore detector flux map data.

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

Sincerely,

Albert W. De Agazio

Albert W. De Agazio, Sr. Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
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2. Safety Evaluation

cc w/enclosures:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NORTH ATLANTIC ENERGY SERVICE CORPORATION, ET AL*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 27
License No. NPF-86

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

   A. The application for amendment by North Atlantic Energy Service Corporation, et al. (the licensee), dated November 25, 1992, as supplemented by letters dated July 2, 1993, and November 24, 1993, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

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*North Atlantic Energy Service Company (NAESCO) is authorized to act as agent for the: North Atlantic Energy Corporation, Canal Electric Company, The Connecticut Light and Power Company, Great Bay Power Corporation, Hudson Light and Power Department, Massachusetts Municipal Wholesale Electric Company, Montaup Electric Company, New England Power Company, New Hampshire Electric Cooperative, Inc., Taunton Municipal Light Plant, The United Illuminating Company, and Vermont Electric Generation and Transmission Cooperative, Inc., and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-86 is hereby amended to read as follows:

   (2) <u>Technical Specifications</u>

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 27 , and the Environmental Protection Plan contained in Appendix B are incorporated into Facility License No. NPF-86. NAESCO shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Albert W. De Agazio for

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: December 22, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 27

FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Replace the following pages of Appendix A, Technical Specifications, with the attached pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change. Overleaf pages have been provided.*

Remove	Insert
iii*	iii*
iv	iv
3/4 1-15*	3/4 1-15*
3/4 1-16	3/4 1-16
3/4 1-17*	3/4 1-17*
3/4 1-18	3/4 1-18
3/4 2-5*	3/4 2-5*
3/4 2-6	3/4 2-6
3/4 2-7	3/4 2-7
3/4 2-8	3/4 2-8
3/4 2-9	3/4 2-9
3/4 2-10*	3/4 2-10*
3/4 3-39*	3/4 3-39*
3/4 3-40	3/4 3-40
B 3/4 2-3	B 3/4 2-3
B 3/4 2-4*	B 3/4 2-4*
B 3/4 3-3*	B 3/4 3-3*
B 3/4 3-4	B 3/4 3-4

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

3.1.3.1 All full-length shutdown and control rods shall be OPERABLE and positioned within ± 12 steps (indicated position) of their group step counter demand position.

APPLICABILITY: MODES 1* and 2*.

ACTION:

a. With one or more full-length rods inoperable because of being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied within 1 hour and be in HOT STANDBY within 6 hours.

b. With one full-length rod trippable but inoperable due to causes other than addressed by ACTION a., above, or misaligned from its group step counter demand height by more than ± 12 steps (indicated position), POWER OPERATION may continue provided that within 1 hour:

   1. The rod is restored to OPERABLE status within the above alignment requirements, or

   2. The rod is declared inoperable and the remainder of the rods in the group with the inoperable rod are aligned to within ± 12 steps of the inoperable rod while maintaining the rod sequence and insertion limits of Specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, or

   3. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

      a) A reevaluation of each accident analysis of Table 3.1-1 is performed within 5 days; this reevaluation shall confirm that the previously analyzed results of these accidents remain valid for the duration of operation under these conditions;

      b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours;

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

LIMITING CONDITION FOR OPERATION

3.1.3.1 ACTION b.3 (Continued)

c) A power distribution map is obtained from the Incore Detector System and $F_Q(Z)$ and $F^N_{\Delta H}$ are verified to be within their limits within 72 hours; and

d) The THERMAL POWER level is reduced to less than or equal to 75% of RATED THERMAL POWER within the next hour and within the following 4 hours the High Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER.

c. With more than one rod trippable but inoperable due to causes other than addressed by ACTION a. above, POWER OPERATION may continue provided that:

1. Within 1 hour, the remainder of the rods in the bank(s) with the inoperable rods are aligned to within ± 12 steps of the inoperable rods while maintaining the rod sequence and insertion limits of Specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, and

2. The inoperable rods are restored to OPERABLE status within 72 hours.

d. With more than one rod misaligned from its group step counter demand height by more than ± 12 steps (indicated position), be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each full-length rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours, except during time intervals when the rod position deviation monitor is inoperable; then verify the group positions at least once per 4 hours.

4.1.3.1.2 Each full-length rod not fully inserted in the core shall be determined to be OPERABLE by movement of at least 10 steps in any one direction at least once per 31 days.

TABLE 3.1-1

ACCIDENT ANALYSES REQUIRING REEVALUATION IN THE EVENT OF AN INOPERABLE FULL-LENGTH ROD

Rod Cluster Control Assembly Insertion Characteristics

Rod Cluster Control Assembly Misalignment

Loss of Reactor Coolant from Small Ruptured Pipes or from Cracks in Large Pipes Which Actuates the Emergency Core Cooling System

Single Rod Cluster Control Assembly Withdrawal at Full Power

Major Reactor Coolant System Pipe Ruptures (Loss-of-Coolant Accident)

Major Secondary Coolant System Pipe Rupture

Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)

POSITION INDICATION SYSTEMS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.3.2 The Digital Rod Position Indication System and the Demand Position Indication System shall be OPERABLE and capable of determining the control rod positions within ± 12 steps.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With a maximum of one digital rod position indicator per bank inoperable, either:

   1. Determine the position of the nonindicating rod(s) indirectly by the Incore Detector System at least once per 8 hours and immediately after any motion of the nonindicating rod which exceeds 24 steps in one direction since the last determination of the rod's position, or

   2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 8 hours.

b. With a maximum of one demand position indicator per bank inoperable, either:

   1. Verify that all digital rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other at least once per 8 hours, or

   2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 8 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.2 Each digital rod position indicator shall be determined to be OPERABLE by verifying that the Demand Position Indication System and the Digital Rod Position Indication System agree within 12 steps at least once per 12 hours, except during time intervals when the rod position deviation monitor is inoperable; then compare the Demand Position Indication System and the Digital Rod Position Indication System at least once per 4 hours.

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HEAT FLUX HOT CHANNEL FACTOR - $F_Q(Z)$

LIMITING CONDITION FOR OPERATION

4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

4.2.2.2 F_{xy} shall be evaluated to determine if $F_Q(Z)$ is within its limit by:

a. Using the Incore Detector System to obtain a power distribution map at any THERMAL POWER greater than 5% of RATED THERMAL POWER,

b. Increasing the measured F_{xy} component of the power distribution map by 3% to account for manufacturing tolerances and further increasing the value by 5% when using the movable incore detectors or 5.21% when using the fixed incore detectors, to account for measurement uncertainties.

c. Comparing the F_{xy} computed (F^{C}_{xy}) obtained in Specification 4.2.2.2b., above, to:

1) The F_{xy} limits for RATED THERMAL POWER (F^{RTP}_{xy}) for the appropriate measured core planes given in Specification 4.2.2.2e. and f., below, and

2) The relationship:

$$F^{L}_{xy} = F^{RTP}_{xy}\,[1+PF_{xy}(1-P)],$$

Where F^{L}_{xy} is the limit for fractional THERMAL POWER operation expressed as a function of F^{RTP}_{xy}, PF_{xy} is the Power Factor Multiplier for F_{xy} specified in the COLR and P is the fraction of RATED THERMAL POWER at which F_{xy} was measured.

d. Remeasuring F_{xy} according to the following schedule:

1) When F^{C}_{xy} is greater than the F^{RTP}_{xy} limit for the appropriate measured core plane but less than the F^{L}_{xy} relationship, additional power distribution maps shall be taken and F^{C}_{xy} compared to F^{RTP}_{xy} and F^{L}_{xy} either:

a) Within 24 hours after exceeding by 20% of RATED THERMAL POWER or greater, the THERMAL POWER at which F^{C}_{xy} was last determined, or

b) At least once per 31 Effective Full-Power Days (EFPD), whichever occurs first.

SURVEILLANCE REQUIREMENTS

4.2.2.2d. (Continued)

2) When the F^C_{xy} is less than or equal to the F^{RTP}_{xy} limit for the appropriate measured core plane, additional power distribution maps shall be taken and F^C_{xy} compared to F^{RTP}_{xy} and F^L_{xy} at least once per 31 EFPD.

e. The F_{xy} limits for RATED THERMAL POWER (F^{RTP}_{xy}) shall be provided for all core planes containing Bank "D" control rods and all unrodded core planes in the CORE OPERATING LIMITS REPORT per Specification 6.8.1.6;

f. The F_{xy} limits of Specification 4.2.2.2e., above, are not applicable in the following core planes regions as measured in percent of core height from the bottom of the fuel:

1) Lower core region from 0 to 15%, inclusive,

2) Upper core region from 85 to 100%, inclusive,

3) Grid plane regions at 17.8 ± 2%, 32.1 ± 2%, 46.4 ± 2%, 60.6 ± 2%, and 74.9 ± 2%, inclusive, and

4) Core plane regions within ± 2% of core height (± 2.88 inches) about the bank demand position of the Bank "D" control rods.

g. With F^C_{xy} exceeding F^L_{xy}, the effects of F_{xy} on $F_Q(Z)$ shall be evaluated to determine if $F_Q(Z)$ is within its limits.

4.2.2.3 When $F_Q(Z)$ is measured for other than F_{xy} determinations, an overall measured $F_Q(Z)$ shall be obtained from a power distribution map and increased by 3% to account for manufacturing tolerances and further increased by 5% when using the movable incore detectors or 5.21% when using the fixed incore detectors, to account for measurement uncertainty.

3/4.2.3 NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

LIMITING CONDITION FOR OPERATION

3.2.3 $F^N_{\Delta H}$ shall be less than $F^{RTP}_{\Delta H}$ [1.0 + $PF_{\Delta H}$ (1-P)].

Where: $P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$, and

$F^{RTP}_{\Delta H}$ = the $F^N_{\Delta H}$ limit at RATED THERMAL POWER (RTP), specified in the CORE OPERATING LIMITS REPORT (COLR), and

$PF_{\Delta H}$ = the Power Factor Multiplier for $F^N_{\Delta H}$ specified in the COLR.

APPLICABILITY: MODE 1.

ACTION:

With $F^N_{\Delta H}$ exceeding its limit:

a. Within 2 hours reduce the THERMAL POWER to the level where the LIMITING CONDITION FOR OPERATION is satisfied.

b. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the limit required by ACTION a., above; THERMAL POWER may then be increased, provided $F^N_{\Delta H}$ is demonstrated through incore mapping to be within its limit.

SURVEILLANCE REQUIREMENTS

4.2.3.1 The provisions of Specification 4.0.4 are not applicable.

4.2.3.2 $F^N_{\Delta H}$ shall be demonstrated to be within its limit prior to operation above 75% RATED THERMAL POWER after each fuel loading and at least once per 31 EFPD thereafter by:

a. Using the Incore Detector System to obtain a power distribution map at any THERMAL POWER greater than 5% RATED THERMAL POWER. |

b. Using the measured value of $F^N_{\Delta H}$ which does not include an allowance for measurement uncertainty.

3/4.2.4 QUADRANT POWER TILT RATIO

LIMITING CONDITION FOR OPERATION

3.2.4 The QUADRANT POWER TILT RATIO shall not exceed 1.02.

APPLICABILITY: MODE 1, above 50% of RATED THERMAL POWER*.

ACTION:

With the QUADRANT POWER TILT RATIO determined to exceed 1.02:

a. Within 2 hours reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.

b. Within 24 hours and every 7 days thereafter, verify that $F_Q(Z)$ (by F_{xy} evaluation) and $F^N_{\Delta H}$ are within their limits by performing Surveillance Requirements 4.2.2.2 and 4.2.3.2. THERMAL POWER and setpoint reductions shall then be in accordance with the ACTION statements of Specifications 3.2.2 and 3.2.3.

SURVEILLANCE REQUIREMENTS

4.2.4.1 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:

a. Calculating the ratio at least once per 7 days when the alarm is OPERABLE, and

b. Calculating the ratio at least once per 12 hours during steady-state operation when the alarm is inoperable.

4.2.4.2 The QUADRANT POWER TILT RATIO shall be determined to be within the limit when above 75% of RATED THERMAL POWER with one Power Range channel inoperable by using the Incore Detector System to confirm indicated QUADRANT POWER TILT RATIO at least once per 12 hours by either:

a. Using the four pairs of symmetric detector locations or

b. Using the Incore Detector System to monitor the QUADRANT POWER TILT RATIO subject to the requirements of Specification 3.3.3.2.

*See Special Test Exceptions Specification 3.10.2

3/4.2.5 DNB PARAMETERS

LIMITING CONDITION FOR OPERATION

3.2.5 The following DNB-related parameters shall be maintained within the following limits:

a. Reactor Coolant System T_{avg}, ≤ 594.3°F

b. Pressurizer Pressure, ≥ 2205 psig*

c. Reactor Coolant System Flow, ≥ 392,000 gpm**

APPLICABILITY: MODE 1.

ACTION:

With any of the above parameters exceeding its limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.5.1 Each of the parameters shown above shall be verified to be within its limits at least once per 12 hours.

4.2.5.2 The RCS flow rate indicators shall be subjected to CHANNEL CALIBRATION at least once per 18 months.

4.2.5.3 The RCS total flow rate shall be determined by a precision heat balance measurement to be within its limit prior to operation above 95% of RATED THERMAL POWER after each fuel loading. The provisions of Specification 4.0.4 are not applicable for entry into MODE 1.

*Limit not applicable during either a THERMAL POWER ramp in excess of 5% of RATED THERMAL POWER per minute or a THERMAL POWER step in excess of 10% of RATED THERMAL POWER.

**Includes a 2.4% flow measurement uncertainty.

TABLE 4.3-3

RADIATION MONITORING INSTRUMENTATION FOR PLANT OPERATIONS SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	DIGITAL CHANNEL OPERATIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
1. Containment				
a. Containment - Post LOCA - Area Monitor	S	R	M	All
b. RCS Leakage Detection				
1) Particulate Radioactivity	S	R	M	1, 2, 3, 4
2) Gaseous Radioactivity	S	R	M	1, 2, 3, 4
2. Containment Ventilation Isolation				
a. On Line Purge Monitor	S	R	M	1, 2, 3, 4
b. Manipulator Crane Area Monitor	S	R	M	6#
3. Main Steam Line	S	R	M	1, 2, 3, 4
4. Fuel Storage Pool Areas				
a. Radioactivity-High-Gaseous Radioactivity	S	R	M	*
5. Control Room Isolation				
a. Air Intake Radiation Level				
1) East Air Intake	S	R	M	All
2) West Air Intake	S	R	M	All
6. Primary Component Cooling Water				
a. Loop A	S	R	M	All
b. Loop B	S	R	M	All

TABLE NOTATIONS

* With irradiated fuel in the fuel storage pool areas.
# During CORE ALTERNATIONS or movement of irradiated fuel within the containment.

INCORE DETECTOR SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.2 The Incore Detector System shall be OPERABLE with:

a. At least 75% of the detector locations and,

b. A minimum of two detector locations per core quadrant.

An OPERABLE incore detector location shall consist of a fuel assembly containing a fixed detector string with a minimum of three OPERABLE detectors or an OPERABLE movable incore detector capable of mapping the location.

APPLICABILITY: When the Incore Detector System is used for:

a. Recalibration of the Excore Neutron Flux Detection System, or

b. Monitoring the QUADRANT POWER TILT RATIO, or

c. Measurement of $F^N_{\Delta H}$, $F_Q(Z)$ and F_{xy}

ACTION:

With the Incore Detector System inoperable, do not use the system for the above applicable monitoring or calibration functions. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

(Plant procedures are used to determine that the Incore Detector System is OPERABLE.)

3/4.3.1 and 3/4.3.2 REACTOR TRIP SYSTEM and ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION (Continued)

Injection pumps start and automatic valves position, (2) Reactor trip, (3) feedwater isolation, (4) startup of the emergency diesel generators, (5) containment spray pumps start and automatic valves position, (6) containment isolation, (7) steam line isolation, (8) turbine trip, (9) emergency feedwater pumps start and automatic valves position, (10) containment cooling fans start and automatic valves position, and (11) automatic service water valves position.

The Engineered Safety Features Actuation System interlocks perform the following functions:

P-4 Reactor tripped - Actuates Turbine trip, closes main feedwater valves on T_{avg} below Setpoint, prevents the opening of the main feedwater valves which were closed by a Safety Injection or High Steam Generator Water Level signal, allows Safety Injection block so that components can be reset or tripped.

Reactor not tripped - prevents manual block of Safety Injection.

P-11 On increasing pressurizer pressure, P-11 automatically reinstates Safety Injection actuation on low pressurizer pressure. On decreasing pressure, P-11 allows the manual block of Safety Injection actuation on low pressurizer pressure, and the manual block of SI and steamline isolation on steamline low pressure. On the manual block of steamline low pressure, manual block of steamline low pressure automatically initiates steamline isolation on steam generator pressure negative rate - high.

P-14 On increasing steam generator water level, P-14 automatically trips the turbine and all feedwater isolation valves; inhibits feedwater control valve modulation; and blocks the start of the startup feedwater pump.

3/4.3.3 MONITORING INSTRUMENTATION

3/4.3.3.1 RADIATION MONITORING FOR PLANT OPERATIONS

The OPERABILITY of the radiation monitoring instrumentation for plant operations ensures that: (1) the associated action will be initiated when the radiation level monitored by each channel or combination thereof reaches its Setpoint, (2) the specified coincidence logic is maintained, and (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance. The radiation monitors for plant operations sense radiation levels in selected plant systems and locations and determine whether or not predetermined limits are being exceeded. If they are, the signals are combined into logic matrices sensitive to combinations indicative of various accidents

MONITORING INSTRUMENTATION

3/4.3.3.1 RADIATION MONITORING FOR PLANT OPERATIONS (Continued)

and abnormal conditions. Once the required logic combination is completed, the system sends actuation signals to initiate alarms or automatic isolation action and actuation of Emergency Exhaust or Ventilation Systems.

3/4.3.3.2 INCORE DETECTOR SYSTEM

The OPERABILITY of the Incore Detector System ensures that the measurements obtained from use of this system accurately represent the spatial neutron flux distribution of the core.

For the purpose of measuring $F_Q(Z)$ or $F^N_{\Delta H}$ a full incore flux map is used. Quarter-core flux maps, as defined in WCAP-8648, June 1976, may be used in recalibration of the Excore Neutron Flux Detection System, and full incore flux maps or symmetric incore detectors may be used for monitoring the QUADRANT POWER TILT RATIO when one Power Range channel is inoperable.

3/4.3.3.3 SEISMIC INSTRUMENTATION

The OPERABILITY of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix A of 10 CFR Part 100. The instrumentation is consistent with the recommendations of Regulatory Guide 1.12, "Instrumentation for Earthquakes," April 1974.

3/4.3.3.4 METEOROLOGICAL INSTRUMENTATION

The OPERABILITY of the meteorological instrumentation ensures that sufficient meteorological data are available for estimating potential radiation doses to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public and is consistent with the recommendations of Regulatory Guide 1.23, "Onsite Meteorological Programs," February 1972.

3/4.3.3.5 REMOTE SHUTDOWN SYSTEM

The OPERABILITY of the Remote Shutdown System ensures that sufficient capability is available to permit safe shutdown of the facility from locations outside of the control room. This capability is required in the event control room habitability is lost and is consistent with General Design Criterion 19 of Appendix A to 10 CFR Part 50.

3/4.2.2 and 3/4.2.3 HEAT FLUX HOT CHANNEL FACTOR and NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR (Continued)

$F^N_{\Delta H}$ will be maintained within its limits provided Conditions a. through d. above are maintained. The relaxation of $F^N_{\Delta H}$ as a function of THERMAL POWER allows changes in the radial power shape for all permissible rod insertion limits.

Fuel rod bowing reduces the value of DNBR. Credit is available to offset this reduction in the generic margin. The generic margins, totaling 9.1% DNBR completely offset any rod bow penalties. This margin includes the following:

a. Design limit DNBR of 1.30 vs. 1.28,

b. Grid spacing (K_S) of 0.046 vs. 0.059,

c. Thermal diffusion coefficient of 0.038 vs. 0.059,

d. DNBR multiplier of 0.86 vs. 0.88, and

e. Pitch reduction.

The applicable values of rod bow penalties are referenced in the FSAR.

When an F_Q measurement is taken, an allowance for both experimental error and manufacturing tolerance must be made. An allowance of 5% is appropriate for a full-core map taken with the movable incore detectors, while 5.21% is appropriate for surveillance results determined with the fixed incore detectors. A 3% allowance is appropriate for manufacturing tolerance.

The Radial Peaking Factor, $F_{xy}(Z)$, is measured periodically to provide assurance that the Hot Channel Factor, $F_Q(Z)$, remains within its limit. The F_{xy} limit for RATED THERMAL POWER (F^{RTP}_{xy}) as provided in the CORE OPERATING LIMITS REPORT per Specification 6.8.1.6 was determined from expected power control maneuvers over the full range of burnup conditions in the core.

When RCS $F^N_{\Delta H}$ is measured, no additional allowances are necessary prior to comparison with the established limit. A measurement error of 4% for $F^N_{\Delta H}$ when determined with the movable incore detectors or 4.13% when determined with the fixed incore detectors has been allowed for in determination of the design DNBR value.

3/4.2.4 QUADRANT POWER TILT RATIO

The purpose of this specification is to detect gross changes in core power distribution between monthly Incore Detector System surveillances. During normal operation the QUADRANT POWER TILT RATIO is set equal to zero once acceptability of core peaking factors has been established by review of incore surveillances. The limit of 1.02 is established as an indication that the power distribution has changed enough to warrant further investigation.

3/4.2.5 DNB PARAMETERS

The limits on the DNB-related parameters assure that each of the parameters is maintained within the normal steady-state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR of 1.30 throughout each analyzed transient. Operating procedures include allowances for measurement and indication uncertainty so that the limits of 594.3°F for T_{avg} and 2205 psig for pressurizer are not exceeded.

The measurement error of 2.4% for RCS total flow rate is based upon performing a precision heat balance and using the result to normalize the RCS flow rate indicators. Potential fouling of the feedwater venturi which might not be detected could bias the result from the precision heat balance in a nonconservative manner. Therefore, a penalty of 0.1% for undetected fouling of the feedwater venturi is applied. Any fouling which might bias the RCS flow rate measurement greater than 0.1% can be detected by monitoring and trending various plant performance parameters. If detected, action shall be taken before performing subsequent precision heat balance measurements, i.e., either the effect of the fouling shall be quantified and compensated for in the RCS flow rate measurement or the venturi shall be cleaned to eliminate the fouling.

The 12-hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation.

The periodic surveillance of indicated RCS flow is sufficient to detect only flow degradation which could lead to operation outside the specified limit.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 27 TO FACILITY OPERATING LICENSE NO. NPF-86

NORTH ATLANTIC ENERGY SERVICE CORPORATION

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

By application dated November 25, 1992 (Ref. 1), as supplemented by letters of July 2, 1993, and November 24, 1993, North Atlantic Energy Service Corporation (North Atlantic/the licensee) proposed an amendment to the Appendix A Technical Specifications (TS) for the Seabrook Station, Unit 1 (Seabrook). The proposed amendment would revise the TS with regard to requirements for use of the movable incore detectors to perform certain core measurements. The proposed changes would allow the use of either the fixed incore detector system or the movable incore detector system to perform TS surveillances. Specifically, the amendment modifies TS Sections 3.1.3, 4.2.2, 4.2.3, 4.2.4, and 3.3.3.

2.0 BACKGROUND

Seabrook contains two complete and independent incore detector systems. The first is a movable incore detector system, which uses movable fission chambers designed by Westinghouse. The second detector system employs self-powered fixed detectors. The fixed incore detection system provides information on the gamma and neutron flux levels in the same 58 instrumented assembly locations within the reactor core as the movable system.

The signal produced from the platinum incore detector (fixed incore detector system) is combined with analytical predictions of neutron flux to estimate the incore three-dimension power distribution. This power distribution is then used to derive the maximum local power peak and hot channel factors which are used to establish limits using a method similar to the one used with the movable incore detector system. A detailed description of the fixed incore detector system is given in Section 2.0 of YAEC-1855P (Ref. 2).

The purpose of the analysis provided in YAEC-1855P is to demonstrate that the fixed incore detector system is comparable in accuracy and functionality to the movable Incore Detector System and to define the uncertainty for these power distribution measurements. It is North Atlantic's intention to use the fixed incore detector system as the primary power distribution measurement system with the movable incore detector system serving as a backup.

3.0 EVALUATION

The previously approved CASMO-3/SIMULATE-3 code package is used as the analytical method for the prediction of neutron detector signals and three dimensional power distributions. This code system was modified to produce analytical predictions of gamma sensitive detector signals on a core-wide basis. The gamma response calculation for platinum detectors within the SIMULATE-3 code is similar to the method used for standard fixed detector type calculations originally developed and demonstrated for rhodium detectors. The total signal given by platinum incore detectors is a function of both the incident gamma and neutron flux. The gamma portion of the detector signal is determined by detailed response and gamma flux calculations. The neutron component is first determined on a core average basis and is then distributed by a weighting function of thermal neutron flux at each detector location. The average signal contribution due to neutrons was determined from operational data and public domain studies and was not the subject of a rigorous testing program.

The methods and calculations described in YAEC-1855P were applied to more than 20 power distribution measurements taken during Cycle 1 and 2 operation at Seabrook. An uncertainty analysis was performed on this data which showed uncertainties of 4.13% for Fdh and 5.21% for Fxy and Fq. These uncertainties are specific to the analytical physics methods, CASMO-3/SIMULATE-3, used at Yankee, the incore data processing code, FINC, and the platinum fixed incore detectors currently in use at Seabrook.

Based on the staff's review of YAEC-1855P, the staff finds the methods employed to convert the platinum detector signals to power distribution are mathematically accurate and reasonable from an engineering standpoint. In addition, the uncertainty analysis performed on the data collected during Cycles 1 and 2 indicates that the Fixed Incore System is comparable in accuracy to the Standard Movable Incore Detector System.

The staff finds that the changes are based on applicable regulatory guidance in Standard Review Plan 5.2.2 (Revision 2), are reasonably conservative, and are acceptable.

However, for the following reasons, the NRC staff finds that both systems should be used until additional benchmark data can be obtained:

1. First, there is a burnup dependence in the fixed/movable inferred measured Fxy and Fq. North Atlantic provided information (Ref. 3) to respond to this concern that shows that the difference most likely is due to the inherent differences in the reactor physics methods used to predict the power distribution. While this may be true, it is important that the ratio be monitored in future cycles to ensure that the two methods do not continue to diverge which would indicate a problem with one of the systems.

2. The fraction of the total signal which is due to neutrons is approximate, is not a well known number, and it is not based on control experiments. It is important that more core burnup be achieved to ensure that this ratio does not change significantly with core life.

3. Third, there is little experience in the United States with a fixed platinum detector system. Seabrook is the first plant to be approved to use this system for TS surveillance, and Seabrook is the first Westinghouse plant to employ a fixed incore detector system to determine core peaking factors.

The staff discussed these concerns with North Atlantic. In response, North Atlantic has committed (Ref. 4) to the following actions:

1. For the remainder of the current Cycle 3 operation, North Atlantic will acquire at least one additional core flux map with the movable incore detector system within the burnup window of end-of-life (EOL) as defined in the Cycle 3 Nuclear Design Report. Eleven Cycle 3 core flux maps have been taken to date with the movable incore detector system.

2. During Cycle 4 operation, North Atlantic will acquire additional core flux map data from the movable incore detector system. At least three core flux maps will be taken with the movable incore detector system, one within each burnup window of beginning-of-life (BOL), middle-of-life (MOL) and EOL as defined in the Cycle 4 Nuclear Design Report.

3. Following completion of Cycle 4 operation, North Atlantic will submit to the NRC a report showing comparison of the fixed and movable incore detector flux map results (Fq, Fxy and FΔh) comparing Cycle 3 and Cycle 4 with the YAEC-1855P values. If the Cycle 3 and Cycle 4 comparisons continue to demonstrate consistency with the results previously provided to the NRC for Cycle 1 and Cycle 2, then the NRC will no longer require further confirmatory movable incore detector flux map data.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Hampshire and Massachusetts State officials were notified of the proposed issuance of the amendment. The State officials had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding

(58 FR 7002). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

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

7.0 REFERENCES

1. North Atlantic Letter NYN-92162, dated November 25, 1992, "License Amendment Request 92-14: Incore Detector System," T. C. Feigenbaum to USNRC.

2. J. P. Gorski, "Seabrook Station Unit 1 Fixed Incore Detector System Analysis," YAEC-1855P, Yankee Atomic Electric Co., October 1992.

3. North Atlantic Letter NYN-93098, dated July 2, 1993, "Response to Request for Additional Information: License Amendment Request 92-14," T. C. Feigenbaum to USNRC.

4. North Atlantic letter NYN- 93161, dated November 24, 1993. "Response to Request [for] Additional Information: License Amendment Request 92-14 (TAC No. M85020)," T. C. Feigenbaum to USNRC.

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