LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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LIMITING CONDITION FOR OPERATION

3.1.3.1 ACTION b.3 (Continued)

System

c) A power distribution map is obtained from the ~~movable~~ incore detectors 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.

REACTIVITY CONTROL SYSTEMS

MOVABLE CONTROL ASSEMBLIES

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 ~~movable~~ incore detectors 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.

POWER DISTRIBUTION LIMITS

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

SURVEILLANCE REQUIREMENTS

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 ~~movable~~ 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% to account for measurement uncertainties,

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

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

2) The relationship:

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

Where F_{xy}^{L} is the limit for fractional THERMAL POWER operation expressed as a function of F_{xy}^{RTP}, 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_{xy}^{C} is greater than the F_{xy}^{RTP} limit for the appropriate measured core plane but less than the F_{xy}^{L} relationship, additional power distribution maps shall be taken and F_{xy}^{C} compared to F_{xy}^{RTP} and F_{xy}^{L} either:

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

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

when using the movable incore detectors or 5.21% when using the fixed incore detectors

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

SURVEILLANCE REQUIREMENTS

4.2.2.2d. (Continued)

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

e. The F_{xy} limits for RATED THERMAL POWER (F_{xy}^{RTP}) shall be provided for all core planes containing Bank "D" control rods and all unrodded corn 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_{xy}^{C} exceeding F_{xy}^{L}, 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% to account for measurement uncertainty.

when using the movable incore detectors or
5.21% when using the fixed incore detectors

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: $P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$, 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 ~~movable~~ incore detector~~s~~ 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 ~~movable~~ incore detector~~s~~ System to confirm indicated QUADRANT POWER TILT RATIO at least once per 12 hours by either:

a. Using the four pairs of symmetric ~~thimble~~ detector locations or

b. Using the ~~movable~~ incore ~~detection~~ 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.

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~~MOVABLE~~ INCORE DETECTORS SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.2 The ~~Movable~~ Incore ~~Detection~~ Detector System shall be OPERABLE with:

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

b. A minimum of two detector ~~thimbles~~ locations per core quadrant. ~~and~~

~~c. Sufficient movable detectors, drive, and readout equipment to map these thimbles.~~

APPLICABILITY: When the ~~Movable~~ Incore ~~Detection~~ 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 ~~Movable~~ Incore ~~Detection~~ 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 ~~Movable~~ Incore ~~Detection~~ Detector System is OPERABLE.)

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.

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BASES

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 Incore Detector Flux Mapping System, and 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 $F^N_{\Delta H}$ 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 flux maps. 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 maps. The limit of 1.02 is established as an indication that the power distribution has changed enough to warrant further investigation.

INSERT A

movable incore detectors, while 5.21% is appropriate for surveillance results determined with the fixed incore detectors.

INSERT B

when determined with the movable incore detectors or 4.13% when determined with the fixed incore detectors

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 ~~MOVABLE~~ INCORE ~~DETECTORS~~ DETECTOR SYSTEM

The OPERABILITY of the ~~movable~~ incore detector~~s~~ system ~~with the specified minimum complement of equipment~~ 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 ~~thimbles~~ 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.

III. Retype of Proposed Changes

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

Revision bars are provided in the right hand margin to designate a change in the text. No revision bars are utilized when the page is changed solely to accommodate the shifting of text due to additions or deletions.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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.

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.

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

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.)

3/4.2.2 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.

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.

IV. Safety Evaluation of License Amendment Request 92-14 Proposed Changes

The Seabrook Station Incore Detector System is comprised of two complete and independent incore detector systems. The first is the movable incore detectors which use movable fission chambers designed by Westinghouse for reactors similar to Seabrook Station. The second is the fixed incore detectors which are self-powered platinum detectors. The fixed and movable incore detectors were installed during plant construction.

The Incore Detector System provides information on the neutron flux distribution at selected core locations. The data obtained from the Incore Detector System, in conjunction with previously determined analytical information, is used to confirm the reactor core design parameters and calculate the hot channel factors.

The purpose of License Amendment Request 92-14 is to revise the Seabrook Station Technical Specifications to allow the fixed incore detectors to be utilized to perform Technical Specification surveillances.

An analysis of the fixed incore detectors was performed by Yankee Atomic Electric Company (YAEC). The attached YAEC report, YAEC-1855P, "Seabrook Station Unit 1 Fixed Incore Detector System Analysis", provides the calculational method and uncertainty analysis for the fixed incore detectors. The calculational method includes the conversion of signal to power and the determination of Technical Specification surveillance parameters. The uncertainty analysis considers contributions from reproducibility, analytical methods and signal processing. The report also addresses detector operability and signal replacement. The conclusion of the report is that the fixed incore detectors are acceptable for performing power distribution surveillances currently performed by the movable incore detectors.

The proposed revision to the Technical Specifications will continue to require that the Incore Detector System be OPERABLE with at least 75% of the detector locations and a minimum of two detector locations per core quadrant OPERABLE. 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.

Like the movable incore detectors, the fixed incore detectors will be verified to be OPERABLE in accordance with Station procedures. The Fixed Incore Detector Code (FINC) will determine which detectors are inoperable based upon the predicted detector signal and the signal from the detectors symmetric partner (if any). A complete detector string will be inoperable when three out of the five detectors on that string are inoperable. The status of each detector is an output from the FINC computer code which informs the user which detectors were declared inoperable. The FINC computer code is discussed in the attached YAEC 1855P.

The movable incore detectors rely upon mechanical switching devices to route the detectors into the various reactor core locations. The movable incore detectors are prone to mechanical failure and require a significant amount of maintenance. During Seabrook Station's first two fuel cycles, greater than four hundred thousand dollars, 600 man-hours and 1 man-rem was expended in maintaining the mechanical portions of the movable incore detectors. The majority of this work involved replacing movable incore detectors which had failed and clearing blockages from some of the movable incore detector drive paths. In comparison, the the fixed incore detectors are an integral part of the instrument tube and are not mechanically inserted into and removed from the reactor core each time they are used. To date, through two cycles of operation, the fixed incore detectors have been relatively maintenance free. Therefore, Incore Detector System maintenance will be

significantly decreased with the use of the fixed incore detectors. This decrease will result in savings of time and man-rem exposure.

In addition, the fix d incore detectors are operationally superior to the movable incore detectors. The fixed incore detectors have the capability of providing almost continuous reactor core flux monitoring. The fixed incore detectors provide flux map data every minute. Using the movable incore detectors it takes greater than two hours to obtain equivalent data.

The BASES of Technical Specifications 3/4.3.3.2 state, in part, that the OPERABILITY of the movable incore detectors ensures that the measurements obtained from their use accurately represent the spatial neutron flux distribution of the (reactor) core. The ability of the fixed incore detectors to also accurately determine core power distribution provides additional assurance of fuel integrity during condition I (normal operations) and condition II (incidents of moderate frequency) events by: (1) maintaining the minimum DNBR in the (reactor) to greater than or equal to 1.30 during normal operation and in short term transients, and (2) limiting the fission gas release, and cladding mechanical properties to within assumed design criteria. In addition, limiting the peak linear power density during condition I events provides assurance that the initial conditions assumed for the LOCA analyses are met and the ECCS acceptance criteria of 2200° peak cladding temperature is not exceeded.

The proposed LCO for the fixed incore detectors will ensure that an OPERABLE Incore Detector System is used to measure reactor core power distribution. It has been demonstrated by the analysis of Y. C-1855P that the fixed incore detectors are capable of accurately measuring reactor core power distribution and are acceptable for performing power distribution surveillances which are currently performed using the movable incore detectors. There are no changes made to any reactor core power distribution limits by the proposed change to Technical Specifications. Therefore the assumptions in the Bases of the Technical Specifications are not affected by the proposed revision to the Technical Specifications.

In conclusion, it has been demonstr ted by the analysis of YAEC-1855P that the fixed incore detectors are acceptable for perf ming power distribution surveillances. Use of the fixed incore detectors will greatly reduce the time spent maintaining the movable incore detectors which will reduce personnel exposure. In addition, personnel safety will be improved by reducing the time spent in the high temperature environment of containment. Use of the fixed incore detectors may also reduce the potential for a plant shutdown caused by inoperable movable incore detectors and the corresponding inability to perform required surveillances. The proposed use of the fixed detectors will ensure an equivalent level of plant safety currently afforded by the movable incore detectors. Therefore, there in no increase in the safety consequences associated with the requested amendment.

V. **Determination of Significant Haz ds for License Amendment Request 92-14 Proposed Changes**

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

The proposed Technical Specification revision does not involve any physical changes to Seabrook Station. Neither the movable incore detectors nor fixed incore detectors are used to mitigate any of the accidents described in UFSAR Chapter 15. No changes to any reactor core power distribution limit is made by the proposed change and accurate power distribution measurements will still be obtained by using the fixed incore detectors. Therefore, the proposed Technical Specification revision does not increase the probability of an accident previously evaluated.

An analysis of the fixed incore detectors was performed for North Atlantic Energy Service Corporation (North Atlantic) by Yankee Atomic Electric Company (YAEC). The results are provided in YAEC report YAEC-1855P, "Seabrook Station Unit 1 Fixed Incore Detector Analysis", which determined that the fixed incore detectors are acceptable for performing power distribution surveillances which are currently performed using the movable incore detectors.

The ability of the fixed incore detectors to accurately determine core power distribution provides assurance of fuel integrity during condition I (normal operations) and condition II (incidents of moderate frequency) events. In addition, limiting the peak linear power density during condition I events provides assurance that the initial conditions assumed for the LOCA analyses are met and the ECCS acceptance criteria of 2200°F peak cladding temperature is not exceeded.

Since the plant response to an accident will not change, there is no change in the potential for an increase in the release of radiation to the public from the use of the fixed incore detectors. Therefore, the consequences of an accident, as measured in terms of dose, will not increase due to the use of the fixed incore detectors to determine reactor core power distribution.

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

No modifications to plant equipment or to the procedures used to operate plant equipment are being made as a result of the proposed Technical Specification revision. The fixed incore detectors were part of the original plant design and have operated in parallel with the movable incore detectors. Being able to use both the fixed incore detectors and the movable incore detectors will decrease the probability of not obtaining incore data. Presently, the Technical Specifications allow only the data from the movable incore detectors to be used for determining reactor core power distribution. This change will permit the data from the already installed and functioning fixed incore detectors to be used for the same purpose.

It has been determined by the analysis of YAEC-1855P that the fixed incore detectors are acceptable to use in determining reactor core power distribution. A Technical Specification LIMITING CONDITION FOR OPERATION (LCO) is proposed for the fixed incore detectors. This proposed LCO is similar to the LCO for the movable incore detectors and

ensures that an OPERABLE Incore Detector System is available for determining reactor core power distribution.

The proposed revision will permit the data from the fixed incore detectors to be used to verify Technical Specification reactor core power distribution. The fixed incore detectors are fully capable of accurately determining reactor core power distribution. Accurately determining the reactor core power distribution ensures that the assumption in the BASES of Technical Specifications and the UFSAR are valid. No changes are being made to plant equipment, reactor core power distribution limits or operating methods, as such, no new failure mechanisms are created by using the fixed incore detectors to monitor reactor core power distribution. Therefore, the possibility of a new or different kind of accident from any previously evaluated, is not created by the proposed revision to the Technical Specifications.

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

The BASES of Technical Specification 3/4.3.3.2 state, in part, that the OPERABILITY of the movable incore detectors ensures that the measurements obtained from their use accurately represent the spatial neutron flux distribution of the (reactor) core. The ability of the fixed incore detectors to also accurately determine core power distribution provides additional assurance of fuel integrity during condition I (normal operations) and condition II (incidents of moderate frequency) events by: (1) maintaining the minimum DNBR in the (reactor) to greater than or equal to 1.30 during normal operation and in short term transients, and (2) limiting the fission gas release, and cladding mechanical properties to within assumed design criteria. In addition, limiting the peak linear power density during condition I events provides assurance that the initial conditions assumed for the LOCA analyses are met and the ECCS acceptance criteria of 2200°F peak cladding temperature is not exceeded.

The proposed LCO for the fixed incore detectors will ensure that an OPERABLE Incore Detector System is used to measure reactor core power distribution. Analysis has demonstrated that the fixed incore detectors are capable of accurately measuring reactor core power distribution and are acceptable for performing power distribution surveillances which currently are performed using the movable incore detectors. No changes to any reactor core power distribution limits are made by the proposed change to Technical Specifications. Therefore, the assumptions in the BASES of Technical Specifications remain valid and the proposed revision does not result in a significant reduction in the margin of safety.

VI. Proposed Schedule for License Amendment Issuance and Effectiveness

North Atlantic requests NRC review of License Amendment Request 92-14 and issuance of a license amendment having immediate effectiveness by May 31, 1993.

The Technical Specification changes proposed herein will enhance the safe operation of the plant by reducing the time spent maintaining the movable incore detectors which will reduce personnel exposure. In addition, personnel safety will be improved by reducing the time spent in the high temperature environment of containment. Use of the fixed incore detectors may also reduce the potential for a plant shutdown caused by inoperable movable incore detectors and the corresponding inability to perform required surveillances.

VII. Environmental Impact Assessment

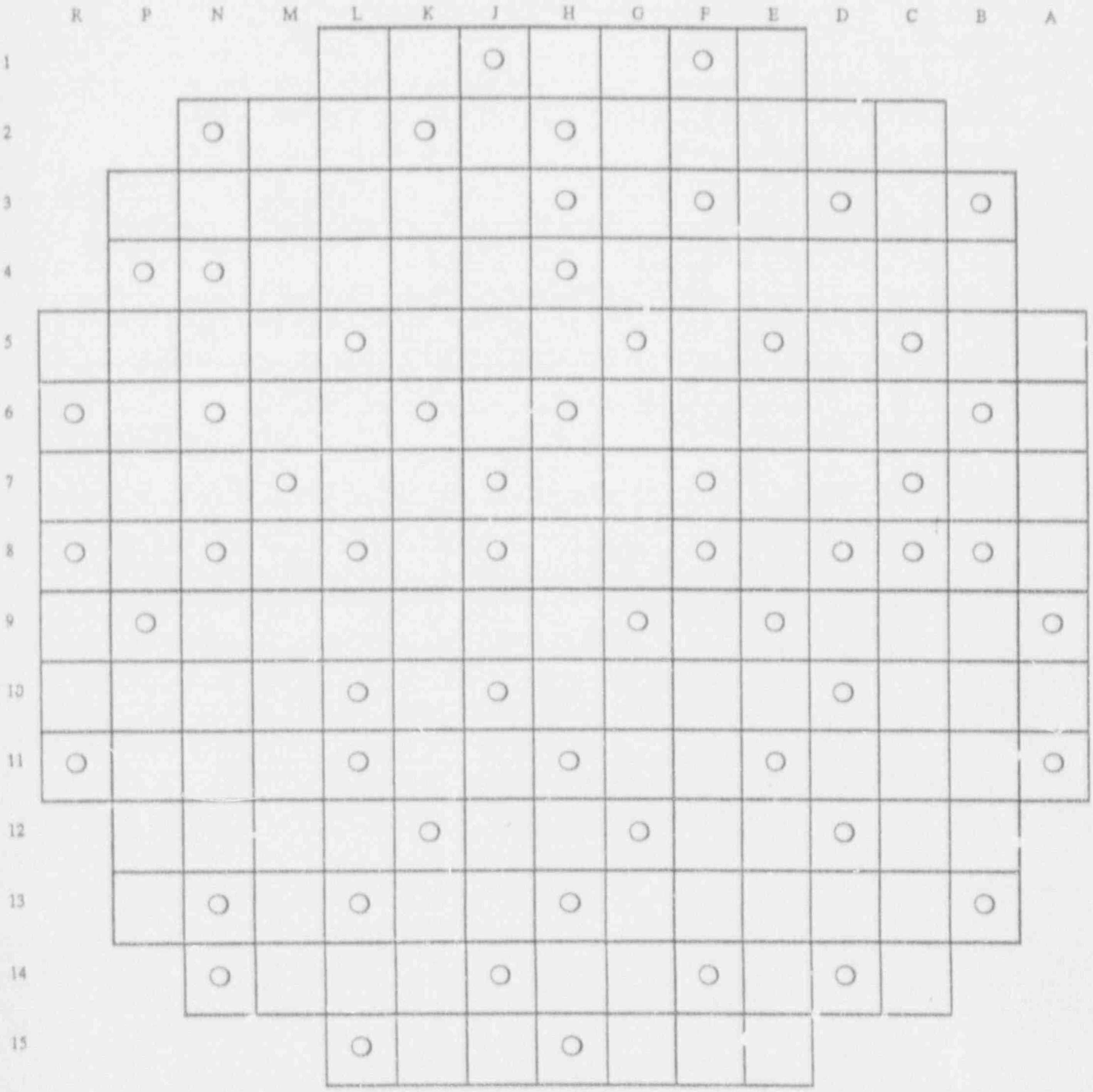
North Atlantic has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental consideration . The proposed changes do not involve a significant hazards consideration, nor increase the types and amounts of effluent that may be released offsite, nor significantly increase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

VIII. Other Supporting Documentation

- Figure 1, Radial Location of Instrument Thimbles
- Figure 2, Instrument Thimble Design
- Figure 3, Axial Position of Platinum Incore Detectors
- Propriety Information Notice
- YAEC-1855P, (Propriety), Seabrook Station Unit 1 Fixed Incore Detector System Analysis
- Proposed changes to the Seabrook Station Cycle 3 Core Operating Limits Report

FIGURE 1

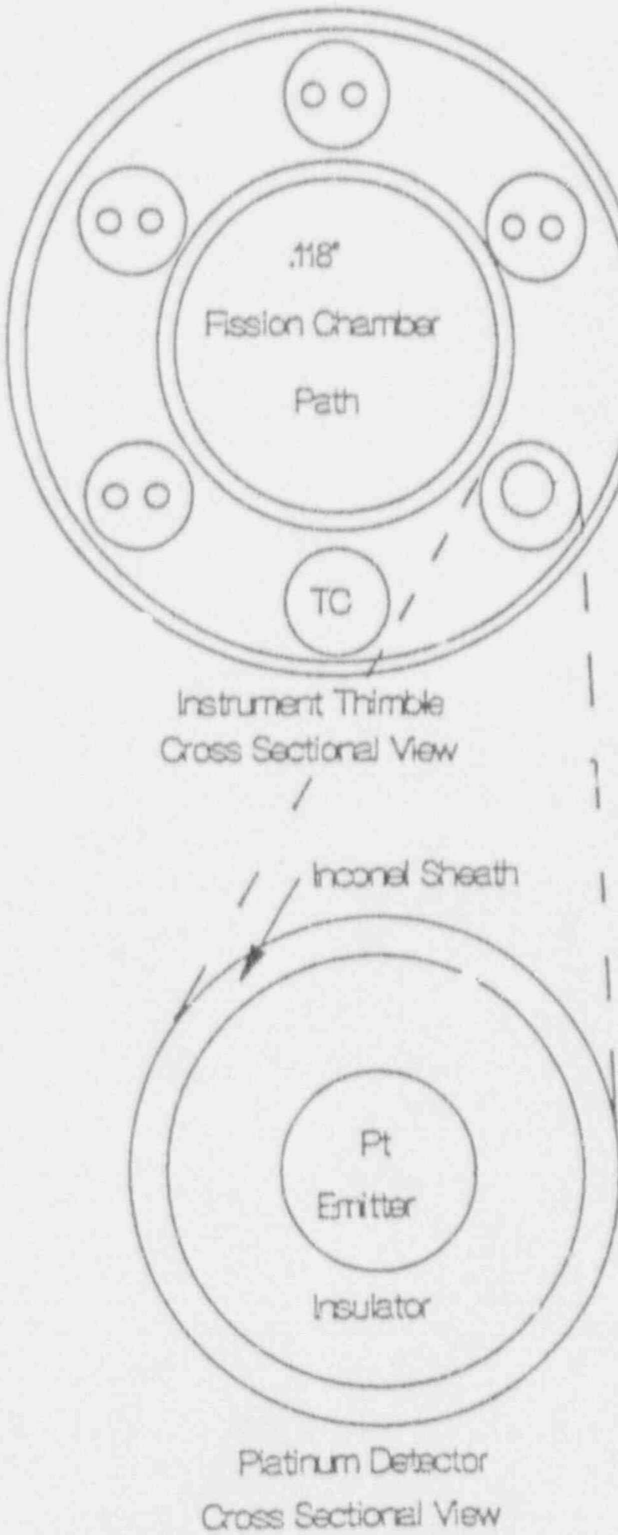
Seabrook Station
Radial Locations of Instrument Thimbles



○ Denotes Instrument Thimble Containing Both A Movable Path And A Fixed Detector String

FIGURE 2

Instrument Thimble Design

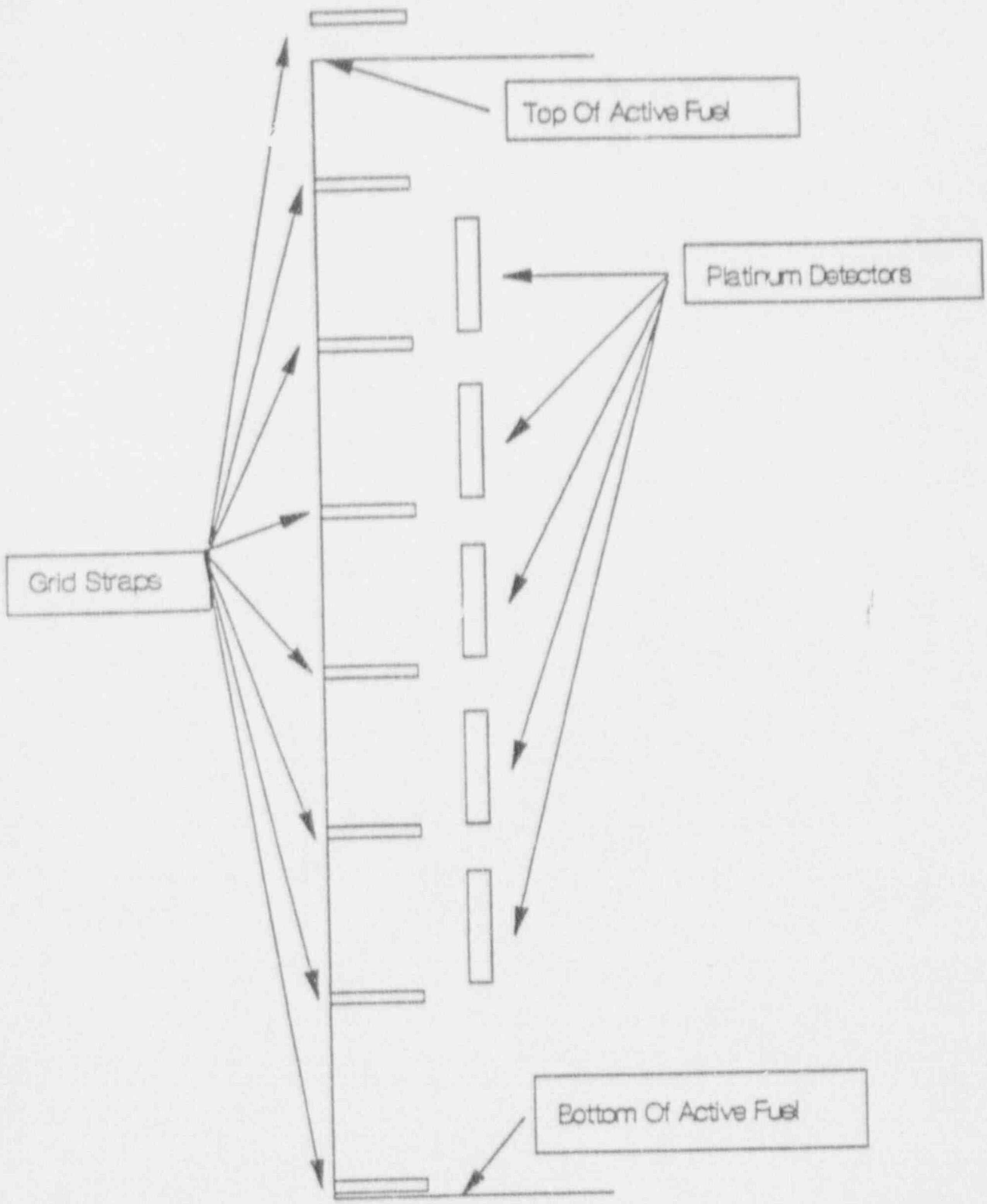


TC = Thermocouple

Drawing Not To Scale

FIGURE 3

Axial Positions of Platinum Incore Detectors



Axial Detector Positions

AFFIDAVIT PURSUANT

TO 10CFR2.790

Yankee Atomic Electric Company)
Nuclear Services Division)
Commonwealth of Massachusetts)
Worcester County) SS:

I, Stephen P. Schultz, depose and say that I am the Vice President of Yankee Atomic Electric Company, duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary. I am submitting this affidavit in conformance with the provisions of 10CFR2.790 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in the report, YAEC-1855P, dated October 1992.

Pursuant to the provisions of Paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1. The material contained in this transmittal was obtained at considerable expense to Yankee Atomic Electric Company and North Atlantic Energy Service Corporation and the release of which would seriously affect our competitive position.

2. The material contained in this transmittal is of the type customarily held in confidence and not customarily disclosed to the public.

3. This information is being transmitted to the Commission in confidence under the provisions of 10CFR2.790 with the understanding that it is to be received in confidence by the Commission.

4. This information is for Commission internal use only and should not be released to persons or organizations outside the Directorate of Regulation and the ACRS without prior approval of Yankee Atomic Electric Company. Should it become necessary to release this information to such persons as part of the review procedure, please contact Yankee Atomic Electric Company.

Further deponent sayeth not.

Sworn to before me this
1st day of October 1992

Stephen P. Schultz
S. P. Schultz
Vice President

Kathryn Gates
Kathryn Gates, Notary Public
My Commission Expires 01/24/97

Core Operating Limits Report

North Atlantic has submitted to the NRC the Seabrook Station Cycle 3 Core operating Limits Report (COLR) (Ref. NYN-92133). Issuance of LAR 92-14 will necessitate a revision to the Cycle 3 COLR due to the slight increase in the measurement uncertainties associated with the fixed incore detectors. Specifically, COLR item 2.8.1 will be revised to indicate that the value for the Nuclear Enthalpy Rise Hot Channel Factor is associated with the movable incore detectors. A new value, reflecting the fixed incore detector measurement uncertainty is being added. This value is derived by removing the measurement uncertainty of 4.13% (as given in YAEC-1855P) from the Nuclear Enthalpy Rise Hot Channel Factor safety analysis limit of 1.55.

2.7.2 K(Z) is specified in Figure 3.

2.7.3 PF_{XY} = 0.2

2.7.4 The F_{XY} limits for Rated Thermal Power within specific core planes shall be:

2.7.4.1 F_{XY} (RTP) less than or equal to 1.850 for all planes containing banks D + C control rods;

2.7.4.2 F_{XY} (RTP) less than or equal to 1.800 for all planes containing bank D control rods;

2.7.4.3 F_{XY} (RTP) less than or equal to 1.640 for all unrodded planes for cycle burnup from 0 up to 1,000 MWD/MTU;

2.7.4.4 F_{XY} (RTP) less than or equal to 1.670 for all unrodded planes for cycle burnup from 1,000 up to 2,000 MWD/MTU;

2.7.4.5 F_{XY} (RTP) less than or equal to 1.680 for all unrodded planes for cycle burnup from 2,000 up through 8,000 MWD/MTU;

2.7.4.6 F_{XY} (RTP) less than or equal to 1.630 for all unrodded planes for cycle burnup from 8,000 up through 12,000 MWD/MTU;

2.7.4.7 F_{XY} (RTP) less than or equal to 1.620 for all unrodded planes for cycle burnup from 12,000 MWD/MTU onward; and

2.7.4.8 See Figure 4 for a plot of $F_Q(Z)$ x P(REL) versus axial core height.

2.8 Nuclear Enthalpy Rise Hot Channel Factor: (Specification 3.2.3)

2.8.1 $F^{RTP}_{\Delta H}$ = 1.490 for the movable incore detector system
$F^{RTP}_{\Delta H}$ = 1.488 for the fixed incore detector system

2.8.2 $PF_{\Delta H}$ = 0.2