

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

PUBLIC SERVICE ELECTRIC AND GAS COMPANY PHILADELPHIA ELECTRIC COMPANY DELMARVA POWER AND LIGHT COMPANY ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 20 License No. DPR-70

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Public Service Electric and Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated March 2, 1979, as revised by letters dated April 30, 1979, July 25, 1979, August 3, 1979, August 8, 1979, August 9, 1979, and September 14, 1979 for potential safety questions 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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- 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) ~? Facility Operating License No. DPR-70 is hereby amended to read as follows:
 - (2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 20, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Shine ut 2.

A. Schwencer, Chief Operating Reactors Branch #1 Division of Operating Reactors

Attachment: Changes to the Technical Specifications

Date of Issuance: October 30, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 20

FACILITY OPERATING LICENSE NO. DPR-70

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Revise Appendix A as follows:

Remove Pages	Insert, Pages
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3/4 2-2 3/4 2-7	3/4 2-2 3/4 2-7 3/4 2-7
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AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within a +5% target band (flux difference units) about the target flux difference. In addition, during the first 72 EFPD (2700 MWD/MTU) operation in Cycle 2, the indicated AFD shall be maintained less than +7.5% at RATED THERMAL POWER with the allowed AFD increasing by 1.0% for each 1.0% reduction in THERMAL POWER.

APPLICABILITY: MODE 1 ABOVE 50% RATED THERMAL POWER*

ACTION:

- a. With the indicated AXIAL FLUX DIFFERENCE outside of the above limits and with THERMAL POWER:
 - 1. Above 90% of RATED THERMAL POWER, within 15 minutes:
 - a) Either restore the indicated AFD to within the target band limits, or
 - Reduce THERMAL POWER to less than 90% of RATED THERMAL POWER.
 - 2. Between 50% and 90% of RATED THERMAL POWER:
 - a) POWER OPERATION may continue provided:
 - The indicated AFD has not been outside of the above limits for more than 1 hour penalty deviation cumulative during the previous 24 hours, and
 - 2) The indicated AFD is within the limits shown on Figure 3.2-1. Otherwise, reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes and reduce the Power Range Neutron Flux-High Trip Setpoints to < 55% of RATED THERMAL POWER within the next 4 hours.

b) Surveillance testing of the Power Range Neutron Flux Channels may be performed pursuant to Specification 4.3.1.1.1 provided the indicated AFD is maintained within the limits of Figure 3.2-1. A total of 16 hours operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.

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*See Special Test Exception 3.10.2

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LIMITING CONDITION FOR OPERATION (Continued)

- b. THERMAL POWER shall not be increased above 90% of RATED THERMAL POWER unless the indicated AFD is within the above limits and ACTION 2.a) 1), above has been satisfied.
- c. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD has not been outside of the above limits for more than 1 hour penalty deviation cumulative during the previous 24 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 15% of RATED THERMAL POWER by:

- a. Monitoring the indicated AFD for each OPERABLE excore channel:
 - At least once per 7 days when the AFD Monitor Alarm is OPERABLE, and
 - At least once per hour for the first 24 hours after restoring the AFD Monitor Alarm to OPERABLE status.
- b. Monitoring and logging the indicated AXIAL FLUX DIFFERENCE for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AXIAL FLUX DIFFERENCE Monitor Alarm is inoperable. The logged values of the indicated AXIAL FLUX DIFFERENCE shall be assumed to exist during the interval preceding each logging.

4.2.1.2 The indicated AFD shall be considered outside of its limits when at least 2 of 4 or 2 of 3 OPERABLE excore channels are indicating the AFD to be outside the limits of Specification 3.2.1. Penalty deviation outside of the limits shall be accumulated on a time basis of:

- a. One minute penalty deviation for each one minute of POWER OPERATION outside of the limits at THERMAL POWER levels equal to or above 50% of RATED THERMAL POWER, and
- b. One-half minute penalty deviation for each one minute of POWER OPERATION outside of the limits at THERMAL POWER levels below 50% of RATED THERMAL POWER.

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SURVEILLANCE REQUIREMENTS (Continued)

b) At least once per 31 EFPD, whichever occurs first 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 C compared to F_{xy}^{RTP} and F_{xy}^{L} at least once per 31 EFPD. e. The F_{xv} limits for RATED THERMAL POWER within specific core planes shall be: 1. For all core planes containing bank "D" control rods; F_{xy} RTP < 1.92 for core elevations up to 6.0 ft., $F_{vv} \stackrel{\text{RTP}}{\leq} 1.89$ for core elevations from 6.0 to 12.0 ft., and For all unrodded planes; $F_{xv} \leq 1.67$ for core elevations up to 6.0 ft., and $F_{yy} \leq 1.65$ for core elevations from 6.0 to 12.0 ft. f. The F, limits of e, above, are not applicable in the following core plane regions as measured in percent of core height from the bottom of the fuel: Lower core region from 0 to 15%, inclusive. 1. Upper core region from 85 to 100% inclusive. Grid plane regions at $17.8 \pm 2\%$, $32.1 \pm 2\%$, $46.4 \pm 2\%$, 2. 3. 60.6 + 2% and 74.9 + 2%, inclusive. Core plane regions within + 2% of core height (+ 2.88 4. inches) about the bank demand position of the bank "D" control rods. g. Evaluating the effects of F_{xy} on $F_Q(Z)$ to determine if $F_Q(Z)$ is within its limit whenever F C exceeds F L.

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SURVEILLANCE REQUIREMENTS (Continued)

4.2.2.3 When $F_Q(Z)$ is measured pursuant to specification 4.10.2.2, 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.

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NUCLEAR ENTHALPY HOT CHANNEL FACTOR - FAH

LIMITING CONDITION FOR OPERATION

3.2.3 F_{AU} shall be limited by the following relationship:

 $F_{AU}^{N} \leq 1.55 [1.0 + 0.2 (1-P)] [1-RBP (BU)]$

where: P = THERMAL POWER , and

RBP(BU)= Rod Bow Penalty as a function of region average burnup as shown in Figure 3.2-3, where a region is defined as those assemblies with the same loading date (reloads) or enrichment (first core).

APPLICABILITY: MODE 1

ACTION:

With F_{AH}^{N} exceeding its limit:

- a. Reduce THERMAL POWER to less than 50% of RATES THERMAL POWER within 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to $\leq 55\%$ of RATED THERMAL POWER within the next 4 hours,
- b. Demonstrate thre in-core mapping that F_{AH}^{N} is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 2 hours, and
- c. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER above the reduced limit required by a. or b. above; subsequent POWER OPERATION may proceed provided that F_{AH} is demonstrated through in-core mapping to be within its^H limit at a nominal 50% of RATED THERMAL POWER prior to exceeding this THERMAL POWER, at a nominal 75% of RATED THERMAL POWER prior to exceeding this THERMAL power and within 24 hrurs after attaining 95% or greater RATED THERMAL POWER.

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Amendment No. 6, 20

SURVEILLANCE REQUIREMENTS

4.2.3.1 F^N shail be determined to be within its limit by using the mov-able incore detectors to obtain a power distribution map:

- Prior to operation above 75% of RATED THERMAL POWER after each fuel loading, and
- b. At least once per 31 Effective Full Power Days.
- c. The provisions of Specification 4.0.4 are not applicable.

4.2.3.2 The measured $F^N_{\Delta H}$ of 4.2.3.1 above, shall be increased by 4% for measurement uncertainty.

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ROD BOW PENALTY (RBP)



SAL

BASES

The specifications of this section provide assurance of fuel integrity during Condition I (Normal Operation) and II (Incidents of Moderate Frequency) events by: (a) maintaining the minimum DNBR in the core > 1.30 during norma' operation and in short term transients, and (b) limiting the fission gas release, fuel pellet temperature 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 limit of 2200°F is not exceeded.

The definitions of hot channel factors as used in these specifications are as follows:

- F_Q(Z) Heat Flux Hot Channel Factor, is defined as the maximum local heat flux on the surface of a fuel rod at core elevation Z divided by the average fuel rod heat flux, allowing for man-ufacturing tolerances on fuel pellets and rods.
- Fⁿ_{ΔH} Nuclear Enthalpy Rise Hot Channel Factor, is defined as the ratio of the integral of linear power along the rod with the highest integrated power to the average rod power.
- F_{xy}(Z) Radial Peaking Factor is defined as the ratio of peak power density to average power density in the horizontal plane at core elevation Z.

3/4.2.1 AXIAL FLUX DIFFERENCE (AFD)

The limits on AXIAL FLUX DIFFERENCE assure that the $F_0(Z)$ upper bound envelope of 2.32 times the normalized axial peaking factor is not exceeded during either normal operation or in the event of xenon redistribution following power changes.

Target flux difference is determined at equilibrium xenon conditions. The full length rods may be positioned within the core in accordance with their respective insertion limits and should be inserted near their normal position for steady state operation at high power levels. The value of the target flux difference obtained under these conditions divided by the fraction of RATED THERMAL POWER is the target flux difference at RATED THERMAL POWER for the associated core burnup conditions. Target flux differences for other THERMAL POWER levels are obtained by multiplying the RATED THERMAL POWER value by the appropriate fractional THERMAL POWER level. The periodic updating of the target flux difference value is necessary to reflect core burnup considerations.

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Amendment No. 16,20

BASES

Although it is intended that the plant will be operated with the AXIAL FLUX DIFFERENCE within the +5% target band about the target flux difference, during rapid plant THERMAL POWER reductions, control rod motion will cause the AFD to deviate outside of the target band at reduced THERMAL POWER levels. This deviation will not affect the xenon redistribution sufficiently to change the envelope of peaking factors which may be reached on a subsequent return to RATED THERMAL POWER (with the AFD within the target band) provided the time duration of the deviation is limited. Accordingly, a 1 hour penalty deviation limit cumulative during the previous 24 hours is provided for operation outside of the target band but within the limits of Figure 3.2-1 while at THERMAL POWER levels between 50% and 90% of RATED THERMAL POWER. For THERMAL POWER levels between 15% and 50% of rated THERMAL POWER, deviations of the AFD outside of the target band are less significant. The penalty of 2 hours actual time reflects this reduced significance.

Provisions for monitoring the AFD are derived from the plant nuclear instrumentation system through the AFD Monitor Alarm. A control room recorder continuously displays the auctioneered high flux difference and the target band limits as a function of power level. A first alarm is received any time the auctioneered high flux difference exceeds the target band limits. A second alarm is received if the AFD exceeds its allowable limits for a cumulative time of one hour during any 24 hour time period starting with the occurrence of the first alarm. Time outside the target band is graphically presented on the strip chart.

Figure B 3/4 2-1 shows a typical monthly target band.

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BASES

3/4.2.2 and 3/4.2.3 HEAT FLUX AND NUCLEAR ENTHALPY HOT CHANNEL AND RADIAL PEAKING FACTORS-

 $F_Q(Z), F_{\Delta H}^N$ and $F_{xy}(Z)$

The limits on heat flux and nuclear enthalpy hot channel factors ensure that 1) the design limits on peak local power density and minimum DNBR are not exceeded and 2) in the event of a LOCA the peak fuel clad temperature will not exceed the 2200°F ECCS acceptance criteria limit.

Each of these hot channel factors are measurable but will normally only be determined periodically as specified in Specifications 4.2.2 and 4.2.3. This periodic surveillance is sufficient to insure that the hot channel factor limits are maintained provided:

- a. Control rod in a single group move together with no individual rod insertion differing by more than \pm 12 steps from the group demand position.
- b. Control rod groups are sequenced with overlapping groups as described in Specification 3.1.3.5.
- c. The control rod insertion limits of Specifications 3.1.3.4 and 3.1.3.5 are maintained.
- d. The axial power distribution, expressed in terms of AXIAL FLUX DIFFERENCE, is maintained within the limits.

The relaxation in F_{A}^{N} as a function of THERMAL POWER allows changes in the radial power shape for all permissible rod insertion limits. F_{A}^{N} will be maintained within its limits provided conditions a thru d above, are maintained.

When an F_0 measurement is taken, both experimental error and manufacturing tolerance must be allowed for. 5% is the appropriate allowance for a full core map taken with the incore detector flux mapping system and 3% is the appropriate allowance for manufacturing tolerance.

When F_{AH}^{N} is measured, experimental error must be allowed for and 4% is the appropriate allowance for a full core map taken with the incore detection system. The specified limit for F_{AH}^{N} also contains an 8% allowance for uncertainties which mean that formal operation will result in $F_{AH}^{N} \leq 1.55/1.08$. The 8% allowance is based on the following considerations:

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BASES

- a. abnormal perturbations in the radial power shape, such as from rod misalignment, effect F_{AH}^{N} more directly than F_{O} ,
- b. although rod movement has a direct influence upon limiting F_Q to within its limit, such control is not readily available to limit $F^N_{\Delta H},$ and
- c. errors in prediction for control power shape detected during startup physics tests can be compensated for in F_0 by restrict-

ing axial flux distributions. This compensation for $F^N_{\Delta H}$ is less readily available.

The radial peaking factor, F (Z), is measured periodically to provide additional assurance that the hot channel factor, F (Z), remains within its limits. The F (Z) limits were determined from expected power control maneuvers over the full range of burnup conditions in the core.

3/4.2.4 QUADRANT POWER TILT RATIO

The quadrant power tilt ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis. Radial power distribution measurements are made during startup testing and periodically during power operation.

The limit of 1.02 at which corrective action is required provides DNB and linear heat generation rate protection with x-y plane power tilts. A limiting tilt of 1.025 can be tolerated before the margin for uncertainty in F_0 is depleted. The limit of 1.02 was selected to provide an allowance

for the uncertainty associated with the indicated power tilt.

The two hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned rod. In the event such action does not correct the tilt, the margin for uncertainty on F_0 is reinstated by

reducing the power by 3 percent from RATED THERMAL POWER for each percent of tilt in excess of 1.0.

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BASES

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are 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.

The 12 hour periodic surveillance of these parameters thro instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected pransient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

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