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

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-295

ZION STATION UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 67
License No. DPR-39

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

   A. The application for amendment by Commonwealth Edison Company (the licensee) dated April 13, 1981, as supplemented by letter dated June 5, 1981, 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.

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. DPR-39 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 67 , 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

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 9, 1981

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

COMMONWEALTH EDISON COMPANY

DOCKET NO. 50-304

ZION STATION UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 64
License No. DPR-48

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

   A. The application for amendment by Commonwealth Edison Company (the licensee) dated April 13, 1981, as supplemented by letter dated June 5, 1981, 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.

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. DPR-48 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 64 , 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

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 9, 1981

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 67 TO FACILITY OPERATING LICENSE NO. DPR-39

AMENDMENT NO. 64 TO FACILITY OPERATING LICENSE NO. DPR-48

DOCKET NOS. 50-295 AND 50-304

Revise Appendix A as follows:

| Remove Pages | Insert Pages |
|---|---|
| vi | vi |
| 45 | 45 |
| 45a | 45a |
| 61 | 61 |
| 68 | 68 |
| 68a | 68a |

## LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1.1-1a | Safety Limits, Four Loop Operation, Unit 1 | 15 |
| 1.1-1b | Safety Limits, Four Loop Operation, Unit 2 | 15A |
| 1.1-2a | Safety Limits, Three Loop Operation, Unit 1 | 16 |
| 1.1-2b | Safety Limits, Three Loop Operation, Unit 2 | 16A |
| 2.1-2 | Flux Difference vs. Percent Flux Difference | 16D |
| 3.2-1 | Required Shutdown Margin vs. Reactor Coolant Boron Concentration | 56 |
| | Control Bank Insertion Limits for: | |
| 3.2-2 | 4 Loop Operation on Unit 1 | 57 |
| 3.2-3 | 3 Loop Operation on Unit 1 | 58 |
| 3.2-4 | 4 Loop Operation on Unit 2 | 59 |
| 3.2-5 | 3 Loop Operation on Unit 2 | 60 |
| 3.2-8 | Rod Cluster Groups | 63 |
| 3.2-9 | Hot Channel Factor Normalized Operating Envelope for Units 1 and 2 | 63a |

| LIMITING CONDITION FOR OPERATION | SURVEILLANCE REQUIREMENT |
|---|---|
| 3.2.2 Power Distribution Limits<br><br>A. Hot Channel Factor Limits*<br><br>1.1 At all times, except during physics tests at ≤ 75% rated power**, the hot channel factors defined in the bases must meet the following limits:<br><br>Units 1 & 2<br><br>$F_Q(Z) \leq [F_Q(Z)]_L \cdot \begin{cases} 2.17/P \times K_1(Z), & \text{for } P > .5 \\ 4.34 \times K_1(Z), & \text{for } P \leq .5 \end{cases}$<br><br>and $F^N_{\Delta H} \leq 1.55[1+0.2(1-P)]$<br><br>where:<br><br>$[F_Q(Z)]_L$ = $F_Q(Z)$ limit;<br><br>2.17 = $F_Q$ constant (LOCA limiting value);<br><br>P = fraction of rated power at which the core operated during $F_Q$ and $F^N_{\Delta H}$ measurement;<br><br>$K_1(Z)$ = factor from Figure 3.2-9 selected at the core elevation, Z, of the measured $F_Q$; | 4.2.2 Power Distribution<br><br>A. Hot Channel Factor Limits<br><br>1.1 Following initial core loading and at a minimum of regular effective full power monthly intervals thereafter, power distribution maps, using the movable detector system, shall be made to confirm that the hot channel factor limits of this specification are satisfied.<br><br>Following initial loading and each subsequent reloading, and power distribution map using the movable Detector system, shall be made to confirm that power distribution limits are met, in the full power configuration before a unit is operated above 75% of rating. |

* The hot channel factors above are defined for a period not to exceed the predicted minimum time to collapse exposure levels for each fuel region as referenced in the bases.

** During Physics tests which may exceed these hot channel factor limits, the reactor may be in this condition for a period of time not to exceed eight hours continuously.

| LIMITING CONDITION FOR OPERATION | SURVEILLANCE REQUIREMENT |
| --- | --- |
| 3.2.2.A.1.1 | |
| The measurement of total peaking factor, $F_Q$ Meas, shall be increased by three percent to account for manufacturing tolerances and further increased by five percent to account for measurement error.<br><br>The measurement of enthalpy rise hot channel factor, $F^H_{\Delta H}$, shall be increased by four percent to account for measurement errors. | |
| 1.2 If the measured hot channel factors exceed the limits in Item 3.2.2.A.1.1 of this specification, the reactor power and the high neutron flux trip setpoints shall be reduced in direct proportion to the excess over the peaking factor which is limiting for that unit. | |

THIS PAGE IS LEFT BLANK
INTENTIONALLY

THIS PAGE IS LEFT BLANK
INTENTIONALLY

When an $F_Q$ measurement is taken, both experimental error and manufacturing tolerance must be allowed for. Five percent is the appropriate allowance for a full core map taken with the movable incore detector flux mapping system and three percent is the appropriate allowance for manufacturing tolerance.

The rod bow penalty (i.e., 14.9% DNBR) on the $F^N_{\Delta H}$ limit has been eliminated by taking credit for available generic DNBR thermal margins which include (1) the design pitch reduction, (2) the thermal diffusion coefficient, (3) the design DNBR valve, and (4) the densification power spike factor. For fuel with a region average burnup of greater than 33,000 MWD/MT, credit is also taken for the peaking factor ($F^N_{\Delta H}$) burndown effect.

In the specified limit of $F^N_{\Delta H}$ [(1)], there is an 8 percent allowance for uncertainties which means that normal operation of the core is expected to result in $F^N_{\Delta H} \leq 1.55/1.08$. The logic behind the larger uncertainty in this case is that (a) abnormal perturbations in the radial power shape (e.g. rod misalignment) affect $F^N_{\Delta H}$, in most cases without necessarily affecting $F_Q$, (b) the operator has a direct influence on $F_Q$ through movement of rods, and can limit it to the desired value, he has no direct control over $F^N_{\Delta H}$ and (c) an error in the predictions for radial power shape, which may be detected during startup physics tests can be compensated for in $F_Q$ by tighter axial control, but compensation for $F^N_{\Delta H}$ is less readily available. When a measurement of $F^N_{\Delta H}$ is taken, experimental error must be allowed for and 4 percent is the appropriate allowance for a full core map taken with the movable incore detector flux mapping system.

Measurements of the hot channel factors are required as part of start-up physics tests and whenever abnormal power distribution conditions require a reduction of core power to a level based on measured hot channel factors. The incore map taken following initial loading provides confirmation of the basic nuclear design bases including proper loading patterns. The periodic monthly incore mapping provides additional assurance that the nuclear design bases remain inviolate and identify operational anomalies which would, otherwise, affect these bases.

For normal operation it is not necessary to measure these quantities continuously. Instead it has been determined that, provided certain conditions are observed, the hot channel factor limits will be met: these conditions are as follows:

1. Control rods in a single bank move together with no individual rod insertion differing by more than 15 inches from the bank demand position. An indicated misalignment limit of ± 12 steps, not including instrument error, precludes a rod misalignment no greater than 15 inches. With maximum instrumentation error considered the actual rod misalignment is no more than 24 steps or 15 inches.

2. Control rod banks are sequenced with overlapping banks as described in Technical Specification 3.2.

3. The full length control bank insertion limits are not violated.

4. Axial power distribution control procedures, which are given in terms of flux differences control or additional axial power monitoring and control bank insertion limits are observed. Flux difference refers to the difference in signals between the top and bottom halves of two-section excore neutron detectors. The flux difference is a measure of the axial offset which is defined as the difference in normalized power between the top and bottom halves of the core.

The permitted relaxation in $F^{N}_{\Delta H}$ allows radial power shape changes with rod insertion limits. It has been determined that provided the above conditions 1 through 4 are observed, these hot channel factor limits are met. In Specifications 3.2.2, $F_Q$ is arbitrarily limited for $P \leq 0.5$.

The procedures for axial power distribution control referred to above are designed to minimize the effects of xenon redistribution on the axial power distribution during loadfollow maneuvers. Basically control of flux difference is required to limit the difference between the current value of Flux Difference ($\Delta I$) and a reference value which corresponds to the full power equilibrium value of Axial offset (Axial Offset = $\Delta I$/fractional power). The reference value of flux difference varies with power level and burnup but expressed as axial offset it varies only with burnup.

The technical specifications on power distribution control assure that the $F_Q$ limit is not exceeded and xenon distributions are not developed which at a later time, would cause greater local power peaking even though the flux difference is then within the limits specified by the procedure.

The target (or reference ) value of flux difference is determined as follows. At any time that equilibrium xenon conditions have been established, the indicated flux difference is noted with the full length rod control rod bank more than 190 steps withdrawn (i.e. normal full power operating position appropriate for the time in life, usually withdrawn farther as burnup proceeds). This value, divided by the fraction of full power at which the core was operating, is the full power value of the target flux difference. Values for all other core power levels are obtained by multiplying the full power value by the fractional power. Since the indicated equilibrium value was noted, no allowances for excore detector error are necessary and indicated deviation of the $\Delta I$ target band are permitted from the indicated reference value. During periods where extensive load following is required, it may be impractical to establish the required core conditions for measuring target flux difference every month. For this reason, the specification provides two methods for updating the target flux difference. The alarms provided are derived from the plant process computer which determines the one minute averages of the operable excore detector outputs to monitor $\Delta I$ in the reactor core and alerts the operator when $\Delta I$ alarm conditions exist. Two types of alarm messages are output. Above a preset power level, an alarm message is output immediately upon determining a delta flux exceeding a preset band about a target delta flux value. Below this preset power level, an alarm message is output if the $\Delta I$ exceeded its allowable limits for a preset cumulative amount of time in the past 24 hours. For periods during which the alarm on flux difference is inoperable, manual surveillance will be utilized to provide adequate warning of significant variations in expected flux differences. However every attempt should be made to restore the alarm to an operable condition as soon as possible. Any deviations from the target band during manual logging shall be treated as deviations during the entire preceeding logging interval and approprate actions shall be taken. This action is necessary to satisfy NRC requirements; however more frequent readings may be logged to minimize the penalty associated with a deviation from the target band to justify continued operation at the current power.

The times that deviations from the band occur are normally accumulated by the computer.