

January 6, 1987

Docket Nos. 50-254/265

Mr. Dennis L. Farrar  
Director of Nuclear Licensing  
Commonwealth Edison Company  
Post Office Box 767  
Chicago, Illinois 60690

Dear Mr. Farrar:

SUBJECT: LOW PRESSURE COOLANT INJECTION (LPCI) TECHNICAL  
SPECIFICATION CHANGE (TAC 63180, 63181)

Re: Quad Cities Nuclear Power Station, Units 1 and 2

The Commission has issued the enclosed Amendment Nos. 98 and 94 to Facility Operating License Nos. DPR-29 and DPR-30 for the Quad Cities Nuclear Power Station, Units 1 and 2. The amendments are in response to your application dated October 22, 1986 to modify the LPCI pump flow surveillance test requirements to support facility modifications for resolution of a single failure concern identified in Inspection and Enforcement Bulletin (IEB) 86-01.

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

Sincerely,

Original signed by

John A. Zwolinski, Director  
BWR Project Directorate #1  
Division of BWR Licensing

Enclosures:

1. Amendment No. 98 to License No. DPR-29
2. Amendment No. 94 to License No. DPR-30
3. Safety Evaluation

cc w/enclosures:  
See next page

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

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

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Zwolinski".

John A. Zwolinski, Director  
BWR Project Directorate #1  
Division of BWR Licensing

Enclosures:

1. Amendment No. 98 to License No. DPR-29
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See next page

Mr. Dennis L. Farrar  
Commonwealth Edison Company

Quad Cities Nuclear Power Station  
Units 1 and 2

cc:

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

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-254

QUAD CITIES NUCLEAR POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 98  
License No. DPR-29

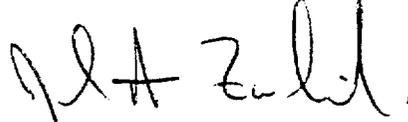
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated October 22, 1986, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules 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 3.B. of Facility Operating License No. DPR-29 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 98, 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



John A. Zwolinski, Director  
BWR Project Directorate #1  
Division of BWR Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: January 6, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 98

FACILITY OPERATING LICENSE NO. DPR-29

DOCKET NO. 50-254

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

<u>REMOVE</u>	<u>INSERT</u>
3.5/4.5-2	3.5/4.5-2
-	3.5/4.5-2a*
Bases 3.5/4.5-11	Bases 3.5/4.5-11
-	Bases 3.5/4.5-11a*

\*Pagination change only

e.	Core spray header $\Delta p$ instrumentation	
	check	Once/day
	calibrate	Once/3 months
	test	Once/3 months
f.	Logic system functional test	Once/Each refueling outage

2. From and after the date that one of the core spray subsystems is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 7 days unless such subsystem is sooner made operable, provided that during such 7 days all active components of the other core spray subsystem and the LPCI mode of the RHR system and the diesel generators required for operation of such components if no external source of power were available shall be operable.

3. The LPCI mode of the RHR system shall be operable whenever irradiated fuel is in the reactor vessel and prior to reactor startup from a cold condition.

4. From and after the date that one of the RHR pumps is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 30 days unless such pump is sooner made operable, provided that during such 30 days the remaining active components of the LPCI mode of the RHR, containment cooling

2. When it is determined that one core spray subsystem is inoperable, the operable core spray subsystem, the LPCI mode of the RHR system, and the diesel generators required for operation of such components if no external source of power were available shall be demonstrated to be operable immediately. The operable core spray subsystem shall be demonstrated to be operable daily thereafter.

3. LPCI mode of the RHR system testing shall be as specified in Specifications 4.5.A.1.a, b, c, d, and f, except that each LPCI division (two RHR pumps per division) shall deliver at least 9000 gpm against a system head corresponding to a reactor vessel pressure of 20 psig, with a minimum flow valve open.

4. When it is determined that one of the RHR pumps is inoperable, the remaining active components of the LPCI mode of the RHR, containment cooling mode of the RHR, both core spray subsystems, and the diesel generators required for operation of such components if no external source of power were available shall be demonstrated to be operable immediately and the operable RHR pumps daily thereafter.

QUAD-CITIES  
DPR-29

mode of the RHR, all active components of both core spray subsystems, and the diesel generators required for operation of such components if no external source of power were available shall be operable.

5. From and after the date that the LPCI mode of the RHR system is made or found to be inoperable for any reason,

5. When it is determined that the LPCI mode of the RHR system is inoperable, both core spray subsystems, the

### 3.5 LIMITING CONDITION FOR OPERATION BASES

#### A. Core Spray and LPCI Mode of the RHR System

This specification assures that adequate emergency cooling capability is available whenever irradiated fuel is in the reactor vessel.

Based on the loss-of-coolant analytical methods described in General Electric Topical Report NEDO-20566 and the specific analysis in Reference 1, core cooling systems provide sufficient cooling to the core to dissipate the energy associated with the loss-of-coolant accident, to limit calculated fuel cladding temperature to less than 2200°F, to assure that core geometry remains intact, to limit cladding metal-water reaction to less than 1%, and to limit the calculated local metalwater reaction to less than 17%.

The limiting conditions of operation in Specifications 3.5.A.1 through 3.5.A.6 specify the combinations of operable subsystems to assure the availability of the minimum cooling systems noted above. Under these limiting Conditions of operation, increased surveillance testing of the remaining ECCS systems provides assurance that adequate cooling of the core will be provided during a loss-of-coolant accident.

Core spray distribution has been shown, in full-scale tests of systems similar in design to that of Quad-Cities 1 and 2, to exceed the minimum requirements by at least 25%. In addition, cooling effectiveness has been demonstrated at less than half the rated flow in simulated fuel assemblies with heater rods to duplicate the decay heat characteristics of irradiated fuel. The accident analysis is additional conservative in that no credit is taken for spray cooling of the reactor core before the internal pressure has fallen to 90 psig.

The LPCI mode of the RHR system is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system functions in combination with the core spray system to prevent excessive fuel cladding temperature. The LPCI mode of the RHR system in combination with the core spray subsystem provides adequate cooling for break areas of approximately 0.2 ft<sup>2</sup> up to and including 4.18 ft<sup>2</sup>, the latter being the double-ended recirculation line break with the equalizer line between the recirculation loops closed without assistance from the high-pressure emergency core cooling subsystems.

The allowable repair times are established so that the average risk rate for repair would be no greater than the basic risk rate. The method and concept are described in Reference 3. Using the results developed in this reference, the repair period is found to be less than

half the test interval. This assumes that the core spray subsystems and LPCI constitute a one-out-of-two system; however, the combined effect of the two systems to limit excessive cladding temperature must also be considered. The test interval specified in Specification 4.5 was 3 months. Therefore, an allowable repair period which maintains the basic risk considering single failures should be less than 30 days, and this specification is within this period. For multiple failures, a shorter interval is specified; to improve the assurance that the remaining systems will function, a daily test is called for. Although it is recognized that the information given in Reference 1 provides a quantitative method to estimate allowable repair times, the lack of operating data to support the analytical approach prevents complete acceptance of this method at this time. Therefore, the times stated in the specific items were established with due regard to judgment.

Should one core spray subsystem become inoperable, the remaining core spray subsystem and the entire LCPI mode of the RHR system are available should the need for core cooling arise. To assure that the remaining core spray, the LPCI mode of the RHR system, and the diesel generators are available, they are demonstrated to be operable immediately. This demonstration includes a manual initiation of the pumps and associated valves and diesel generators. Based on judgements of the reliability of the remaining systems, i.e., the core spray and LPCI, a 7-day repair period was obtained.



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

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

DOCKET NO. 50-265

QUAD CITIES NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 94  
License No. DPR-30

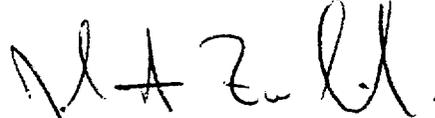
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated October 22, 1986, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules 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 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 3.B. of Facility Operating License No. DPR-30 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 94, 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



John A. Zwolinski, Director  
BWR Project Directorate #1  
Division of BWR Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: January 6, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 94

FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE

3.5/4.5-2

-

INSERT

3.5/4.5-2

3.5/4.5-2a\*

\*Pagination change only

e.	Core spray header $\Delta$ p instrumentation check	Once/day
	calibrate	Once/3 months
	test	Once/3 months
f.	Logic system functional test	Once/Each refueling outage

2. From and after the date that one of the core spray subsystems is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 7 days unless such subsystem is sooner made operable, provided that during such 7 days all active components of the other core spray subsystem and the LPCI mode of the RHR system and the diesel generators required for operation of such components if no external source of power were available shall be operable.
3. The LPCI mode of the RHR system shall be operable whenever irradiated fuel is in the reactor vessel and prior to reactor startup from a cold condition.
4. From and after the date that one of the RHR pumps is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 30 days unless such pump is sooner made operable, provided that during such 30 days the remaining active components of the LPCI mode of the RHR, containment cooling
2. When it is determined that one core spray subsystem is inoperable, the operable core spray subsystem, the LPCI mode of the RHR system, and the diesel generators required for operation of such components if no external source of power were available shall be demonstrated to be operable immediately. The operable core spray subsystem shall be demonstrated to be operable daily thereafter.
3. LPCI mode of the RHR system testing shall be as specified in Specifications 4.5.A.1.a, b, c, d, and f, except that each LPCI division (two RHR pumps per division) shall deliver at least 9000 gpm against a system head corresponding to a reactor vessel pressure of 20 psig, with a minimum flow valve open.
4. When it is determined that one of the RHR pumps is inoperable, the remaining active components of the LPCI mode of the RHR, containment cooling mode of the RHR, both core spray subsystems, and the diesel generators required for operation of such components if no external source of power were available shall be demonstrated to be operable immediately and the operable RHR pumps daily thereafter.

mode of the RHR, all active components of both core spray subsystems, and the diesel generators required for operation of such components if no external source of power were available shall be operable.

5. From and after the date that the LPCI mode of the RHR system is made or found to be inoperable for any reason,

5. When it is determined that the LPCI mode of the RHR system is inoperable, both core spray subsystems, the



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SUPPORTING AMENDMENT NO. 98 TO FACILITY OPERATING LICENSE NO. DPR-29  
AND AMENDMENT NO. 94 TO FACILITY OPERATING LICENSE NO. DPR-30

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-254/265

1.0 INTRODUCTION

By letter dated October 22, 1986, Commonwealth Edison Company (CECo), the licensee for Quad Cities Station Units 1 & 2, has requested an amendment to the Quad Cities Units 1 & 2 Technical Specifications (TS) to modify the Low Pressure Coolant Injection (LPCI) pump flow test requirements from the current three pump test demonstrating 14,500 gpm to a two pump test demonstrating 9000 gpm. This change is required to support a modification to the LPCI pump minimum flow valve control logic to resolve a single failure concern identified in Inspection and Enforcement (IE) Bulletin 86-01: "Minimum Flow Logic Problems That Could Disable RHR Pumps" (May 23, 1986).

2.0 EVALUATION

The existing LPCI loop selection logic is such that failure of either the "A" loop or "B" loop flow sensor would close both the "A" and "B" minimum flow valves. In response to IE Bulletin 86-01, this logic is being modified so that the "A" valve is controlled only by the "A" flow sensor and the "B" valve by the "B" sensor. Figure 1 illustrates the modified configuration. This new configuration, however, results in reduced LPCI flow to the vessel under certain design basis accident conditions.

As an example, consider that during a design basis loss-of-coolant accident (LOCA), after loop selection, both residual heat removal (RHR) loops will be injecting into the unbroken reactor recirculation loop (see attached Figure 1). If the "A" recirculation loop is broken, RHR loop "B" pumps will be injecting through the normal injection path to the unbroken recirculation loop "B". This flow will pass through the "B" flow element and automatically close the minimum flow valve in RHR loop "B". RHR loop "A" pumps will be injecting through the cross-tie valve to recirculation "B" because the LPCI injection valve to the broken reactor recirculation loop "A" will be closed. Since there is no flow going through the RHR loop "A" flow element, the minimum flow valve in RHR loop "A" will remain open. This reduces the rate of flow to the core by an amount equivalent to the flow through the minimum flow line.

The reduced LPCI flow to the vessel is less than that flow assumed in the current LOCA analysis. Hence, the licensee performed a new analysis to demonstrate compliance with the criteria of 10 CFR 50.46.

In the current LOCA analyses, the most limiting event is the hypothetical, double-ended recirculation suction line break with an assumed failure of the LPCI injection valve. This scenario assumes no credit for the LPCI pumps; therefore, the proposed change in the LPCI flow has no effect on the core cooling capability for the most limiting event.

The second most limiting break and single failure combination is the Design Basis Accident (DBA) recirculation suction line break with a diesel generator failure. This scenario requires one low pressure core spray pump and two LPCI pumps for core cooling. General Electric has analyzed this event assuming the proposed 9000 gpm flow rate for two LPCI pumps rather than the 9667 gpm flowrate assumed in the initial Appendix K analysis. The results of this analysis indicate that with the revised flow rate, the peak cladding temperature (PCT) increases by 32°F to 179°F. This temperature is well below the Quad Cities limiting break PCT and the 2200°F limit set by 10 CFR 50.46. This is acceptable.

The proposed TS revisions also require that a two pump RHR/LPCI test at a flow rate of 9000 gpm be performed every 3 months, rather than the current three pump 14,500 gpm test. The proposed testing is acceptable since it verifies the flow assumed in the analyses; therefore, the proposed TS changes in 3.5/4.5.A.3 are acceptable.

### 3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change to requirements with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendments involve 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 these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet 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 nor environmental assessment need be prepared in connection with the issuance of these amendments.

### 4.0 CONCLUSION

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security nor to the health and safety of the public.

Principal Contributor: G. Thomas, T. Rotella

Dated: January 6, 1987.

FIGURE 1.--ILLUSTRATION OF MODIFIED CONFIGURATION

