December 7, 1990

Docket Nos. 50-254
and 50-265

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Mr. Thomas J. Kovach
Nuclear Licensing Manager
Commonwealth Edison Company-Suite 300
OPUS West III
1400 OPUS Place
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Dear Mr. Kovach:

SUBJECT: EXEMPTION FROM THE TECHNICAL REQUIREMENTS OF GENERAL DESIGN CRITERION 17 OF APPENDIX A TO 10 CFR PART 50 FOR THE QUAD CITIES LPCI SWING BUS DESIGN (TAC NOS. 69420 AND 69421)

The Low Pressure Coolant Injection (LPCI) swing bus design at Quad Cities, Units 1 and 2, was found acceptable in the Quad Cities Safety Evaluation Report, issued August 25, 1971. The design was reexamined and again found acceptable in NUREG-0138, published November 1976. Both documents acknowledge that the design does not meet General Design Criterion (GDC) 17 of Appendix A to 10 CFR Part 50. Enclosed is the Exemption from GDC 17. A copy of this Exemption is being filed with the Office of the Federal Register.

Sincerely,

Original Signed By:

Richard J. Barrett, Director
Project Directorate III-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

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Enclosure:
Exemption
cc w/enclosure:
See next page

DOCUMENT NAME: [69420 AND 69421 EXEMPTION]

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Office:	*LA/PDIII-2	PM/PDIII-2	PD/PDIII-2	*OGC	ADR3/DRP345
Surname:	CMoore	LOlshan/tg	RBarrett	CBarth	JZwolinski
Date:	09/21/90	11/28/90	11/29/90	10/29/90	12/7/90
Office:	D/DRP345				
Surname:	BBoger				
Date:	12/7/90				

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Mr. Thomas J. Kovach
Commonwealth Edison Company

Quad Cities Nuclear Power Station
Units 1 and 2

cc:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-254 and 50-265
	)	
(Quad Cities Nuclear Power Station, Units 1 and 2	)	

EXEMPTION

I.

The Commonwealth Edison Company (CECo or the licensee) is the holder of Operating License No. DPR-29 which authorizes operation of Quad Cities Nuclear Power Station (QCNPS) Unit 1, and Operating License No. DRP-30 which authorizes operation of Unit 2. These licenses provide, among other things, that QCNPS Units 1 and 2, are subject to all rules, regulations, and Orders of the Commission now or hereafter in effect.

The station is comprised of two boiling water reactors at the licensee's site located in Rock Island County, Illinois.

II.

In September 1987, the Fermi 2 plant was found to be vulnerable to a total Low Pressure Coolant Injection (LPCI) failure resulting from a single failure of DC control power in one division. In reviewing the design modifications proposed to correct this vulnerability, the staff relooked at the LPCI swing bus design.

The original Quad Cities (a BWR-4 plant) design utilizes the swing bus configuration to provide power to the valves required for Low Pressure Coolant Injection (LPCI) from either of two redundant standby (onsite) power sources. Under Regulatory Guide (R.G.) 1.6 for Class 1E electric power systems, a swing bus concept does not satisfy the single failure criterion as it can potentially

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cause redundant emergency diesel generators to be paralleled resulting in the loss of redundant emergency power sources (common mode failure). Since a swing bus could compromise this independence requirement of redundant Class 1E power sources and their load groups, automatic bus transfer schemes are not permitted between redundant safety trains. The swing bus configuration violates General Design Criterion (GDC) 17 of Appendix A to 10 CFR Part 50 requirements as the onsite electrical power systems do not have the desired independence to ensure performance of their safety functions.

III.

The swing bus design was permitted in the past to accommodate the design of the ECCS/LPCI mechanical system, valve arrangement, loop selection logic, etc. The staff acknowledged and approved the LPCI swing bus design weakness in Section 3.6.2 of the Quad Cities Safety Evaluation Report, dated August 25, 1971. However, an Exemption to GDC-17 had never been issued. Furthermore, the LPCI swing bus design weakness had been identified as one of fifteen technical issues in NUREG-0138, issued November 1976. The staff discussion had been provided in the NUREG under Issue No. 3 entitled, "Acceptability of Swing Bus Design of BWR-4 [1/] Plants." It stated that, "The swing bus design approved for use in the BWR-4 plants does not satisfy the single failure criterion or the independence requirements of GDC-17." It further stated that, "the swing bus design was accepted in construction

---

1/ The staff found that the LPCI swing bus design has been used in both BWR-3 and -4 product lines, therefore, this issue applies to both BWR-3 and -4 plants.

permit (CP) review of the BWR-4 product line prior to development of R.G. 1.6." As a result, the staff did not require that the BWR-4 product line be changed to eliminate the swing bus design, except for some plants when such a change was required to meet the ECCS criteria of 10 CFR 50.46. For those plants that chose not to perform an analysis of a complete LPCI failure coincident with LOCA analysis, the licensees were either required to remove the swing bus design or to commit to do so. In some cases, plants were allowed to modify the LPCI swing bus design into a split-bus design so that it could take credit for a portion of the LPCI flow in LOCA analysis.

Although the LPCI swing bus has never satisfied R.G. 1.6 recommendations, the staff accepted the swing bus design in NUREG-0138 principally because the ECCS acceptance criteria can be met without any LPCI function. Nevertheless, for those BWR-3 and -4 plants that retained their swing bus design, the staff suggested the following alternative recommendations which are considered comparable to meeting R.G. 1.6 recommendations:

A. 1) Only loads associated with LPCI function, i.e., LPCI valve motors may be connected to the swing bus so as to confine single failures within the swing bus.

2) The bus transfer scheme (circuitry) must meet the applicable portions of IEEE Standard 279, such as the <u>single failure criterion</u>, testability, and quality of components to reduce probability of propagating electrical faults between divisions.

3) Proper coordination of circuit protective devices must be provided to lessen probability of propagating faults into non-LPCI portions of the electrical division. This requires that the design provide both an adequate number of circuit breakers and proper breaker coordination.

B. Splitting the swing bus into two buses to obtain partial ECCS credit.

R.G. 1.6 prohibits the use of the swing bus as it does not satisfy the staff position regarding sufficient independence to satisfy GDC 17. However, the staff has determined that reasonable independence can be assured with the implementation of either the above alternate recommendations. Quad Cities has implemented the first of the alternate recommendations which brings the design to a level of safety comparable to that of meeting GDC 17. On this basis, the staff did not consider that the increase in independence provided by a change in the swing bus design to satisfy R.G. 1.6 was justified for Quad Cities.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12: (a)(1) and (a)(2)(ii) the Exemption from GDC 17 is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security, and (2) application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The Commission has reexamined its 1976 discussion (Issue No. 3) in NUREG-0138 and the technical basis, and continues to concur with the general technical assessment, therein, that alternative recommendations set out above provide an equivalent level of safety

as that which be achieved without a swing bus design. Accordingly, the Commission hereby grants the Exemption from GDC 17 of Appendix A to 10 CFR Part 50.

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register (55 FR 50624). Accordingly, based upon the environmental assessment, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment.

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

BABoger

Bruce A. Boger, Director
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 7th day of December, 1990

December 7, 1990

Docket Nos. 50-254
and 50-265

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Sincerely,

Original Signed By:

Richard J. Barrett, Director
Project Directorate III-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosure:
Exemption
cc w/enclosure:
See next page

DOCUMENT NAME: [69420 AND 69421 EXEMPTION]

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Surname:	BBoger				
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Mr. Thomas J. Kovach
Commonwealth Edison Company

Quad Cities Nuclear Power Station
Units 1 and 2

cc:

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In the Matter of COMMONWEALTH EDISON COMPANY (Quad Cities Nuclear Power Station, Units 1 and 2	))))))	Docket Nos. 50-254 and 50-265

EXEMPTION

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III.

The swing bus design was permitted in the past to accommodate the design of the ECCS/LPCI mechanical system, valve arrangement, loop selection logic, etc. The staff acknowledged and approved the LPCI swing bus design weakness in Section 3.6.2 of the Quad Cities Safety Evaluation Report, dated August 25, 1971. However, an Exemption to GDC-17 had never been issued. Furthermore, the LPCI swing bus design weakness had been identified as one of fifteen technical issues in NUREG-0138, issued November 1976. The staff discussion had been provided in the NUREG under Issue No. 3 entitled, "Acceptability of Swing Bus Design of BWR-4 [1/] Plants." It stated that, "The swing bus design approved for use in the BWR-4 plants does not satisfy the single failure criterion or the independence requirements of GDC-17." It further stated that, "the swing bus design was accepted in construction

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IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12: (a)(1) and (a)(2)(ii) the Exemption from GDC 17 is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security, and (2) application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The Commission has reexamined its 1976 discussion (Issue No. 3) in NUREG-0138 and the technical basis, and continues to concur with the general technical assessment, therein, that alternative recommendations set out above provide an equivalent level of safety

as that which be achieved without a swing bus design. Accordingly, the Commission hereby grants the Exemption from GDC 17 of Appendix A to 10 CFR Part 50.

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register (55 FR 50624). Accordingly, based upon the environmental assessment, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment.

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

BABoger

Bruce A. Boger, Director
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 7th day of December, 1990