

February 7, 1986

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: CRD SCRAM TIME TESTING

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

The Commission has issued the enclosed Amendment Nos. 92 and 89 to Facility Operating License Nos. DPR-29 and DPR-30 for the Quad Cities Nuclear Power Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications in response to your application dated May 2, 1983.

The amendments authorize changes to the Technical Specifications which specify what the reactor pressure should be when conducting scram testing following a refueling outage and revise the requirement of isolating the control rod drive pumps to apply only to single rod scram testing.

A copy of the 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. 92 to License No. DPR-29
2. Amendment No. 89 to License No. DPR-30
3. Safety Evaluation

cc w/enclosures:
See next page

DISTRIBUTION

Docket File	CJamerson	BGrimes	OPA, CMiles
NRC PDR	RBevan	TBarnhart (8)	RDiggs(w/fee form)
Local PDR	OELD	WJones	Gray File
BWD #1 Reading	LJHarmon	DVassallo	JPartlow
RBernero	ELJordan	ACRS (10)	

DBL:PD#1
CJamerson
1/21/86

DBL:PD#1
RBevan
1/21/86

OELD
1/23/86

DBL:PD#1
JZwolinski
2/1/86

8602180247 860207
PDR ADDCK 05000254
P PDR

Mr. Dennis L. Farrar
Commonwealth Edison Company

Quad Cities Nuclear Power Station

cc:

Mr. B. C. O'Brien
President
Iowa-Illinois Gas and
Electric Company
206 East Second Avenue
Davenport, Iowa 52801

James G. Keppler
Regional Administrator
Region III Office
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Robert G. Fitzgibbons, Jr.
Isham, Lincoln & Beale
Three First National Plaza
Suite 5200
Chicago, Illinois 60602

Mr. Nick Kalivianakis
Plant Superintendent
Quad Cities Nuclear Power Station
22710 - 206th Avenue - North
Cordova, Illinois 61242

Resident Inspector
U. S. Nuclear Regulatory Commission
22712 206th Avenue North
Cordova, Illinois 61242

Chairman
Rock Island County Board
of Supervisors
Rock Island County Court House
Rock Island, Illinois 61201

The Honorable Tom Corcoran
United States House of
Representatives
Washington, D. C. 20515

Mr. Gary N. Wright
Nuclear Facility Safety
Illinois Department of
Nuclear Safety
1035 Outer Park Drive, 5th Floor
Springfield, Illinois 62704



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. 92
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 May 2, 1983, 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-29 is hereby amended to read as follows:

8602180256 860207
PDR ADDCK 05000254
PDR

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 92, 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: February 7, 1986.

ATTACHMENT TO LICENSE AMENDMENT NO. 92

FACILITY OPERATING LICENSE NO. DPR-29

DOCKET NO. 50-254

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Pages

3.3/4.3-4

3.3/4.3-10

QUAD-CITIES

DPR-29

- c. the operating power level shall be limited so that the MCPR will remain above the MCPR fuel cladding integrity safety limit assuming a single error that results in complete withdrawal of any single operable control rod.

C. Scram Insertion Times

1. The average scram insertion time, based on the deenergization of the scram pilot valve solenoids at time zero, of all operable control rods in the reactor power operation condition shall be no greater than:

<i>% Inserted From Fully Withdrawn</i>	<i>Average Scram Insertion Times (sec)</i>
5	0.375
20	0.900
50	2.00
90	3.50

The average of the scram insertion times for the three fastest control rods of all groups of four control rods in a two by two array shall be no greater than:

<i>% Inserted From Fully Withdrawn</i>	<i>Average Scram Times (sec)</i>
5	0.398
20	0.954
50	2.12
90	3.80

2. The maximum scram insertion time for 90% insertion of any operable control rods shall not exceed 7 seconds.
3. If Specification 3.3.C.1 cannot be met, the reactor shall not be made supercritical; if operating, the reactor shall be shut down immediately upon determination that average scram time is deficient.
4. If Specification 3.3.C.2 cannot be met, the deficient control rod shall be con-

C. Scram Insertion Times

1. After refueling outage and prior to operation above 30% power, with reactor pressure above 800 psig, all control rods shall be subject to scram-time measurements from the fully withdrawn position. The scram times for single rod scram testing shall be measured without reliance on the control rod drive pumps.

2. All control rod drives shall have experienced scram test measurements each year. Also, 50% of the control rod drives in each quadrant of the reactor core shall be measured for the scram times specified in Specification 3.3.C during the interval not more frequently than 16 weeks nor less frequently than 32 weeks. These tests shall be performed with a reactor pressure above 800 psig and may be measured during a reactor scram. Whenever all of the control rod drive scram times have been measured, an evaluation shall be made to

3.3/4.3-4

QUAD CITIES
URR-29

C. Scram Insertion Times

The control rod system is analyzed to bring the reactor subcritical at a rate fast enough to prevent fuel damage, i.e., to prevent the MCPR from becoming less than the fuel cladding integrity safety limit.

Analysis of the limiting power transient shows that the negative reactivity rates resulting from the scram with the average response of all the drives as given in the above specification, provide the required protection, and MCPR remains greater than the fuel cladding integrity safety limit. It is necessary to raise the MCPR operating limit (per Specification 3.5.K) when the average 20% scram insertion time reaches 0.73 seconds on a cycle cumulative basis (overall average of surveillance data to date) in order to comply with assumptions in the implementation procedure for the ODYN transient analysis computer code. The basis for choosing 0.73 seconds is discussed further in the bases for Specification 3.5.K. In the analytical treatment of the transients, 290 milliseconds are allowed between a neutron sensor reaching the scram point and the start of motion of the control rods. This is adequate and conservative when compared to the typically observed time delay of about 210 milliseconds. Approximately 90 milliseconds after neutron flux reaches the trip point, the pilot scram valve solenoid deenergizes and 120 milliseconds later the control rod motion is estimated to actually begin. However, 200 milliseconds rather than 120 milliseconds is conservatively assumed for this time interval in the transient analyses and is also included in the allowable scram insertion times specified in Specification 3.3.C.

The scram times for all control rods will be determined at the time of each refueling outage. A representative sample of control rods will be scram tested during the interval of greater than 16 weeks but not more than 32 weeks

Scram times of new drives are approximately 2.5 to 3 seconds; lower rates of change in scram times following initial plant operation at power are expected. The test schedule provides reasonable assurance of detection of slow drives before system deterioration beyond the limits of Specification 3.3.C. The program was developed on the basis of the statistical approach outlined below and judgment.

The history of drive performance accumulated to date indicates that the 90% insertion times of new and overhauled drives approximate a normal distribution about the mean which tends to become skewed toward longer scram times as operating time is accumulated. The probability of a drive not exceeding the mean 90% insertion time by 0.75 seconds is greater than 0.999 for a normal distribution. The measurement of the scram performance of the drives surrounding a drive exceeding the expected range of scram performance will detect local variations and also provide assurance that local scram time limits are not exceeded. Continued monitoring of other drives exceeding the expected range of scram times provides surveillance of possible anomalous performance.

The numerical values assigned to the predicted scram performance are based on the analysis of the Dresden 2 startup data and of data from other BWR's such as Nine Mile Point and Oyster Creek.

The occurrence of scram times within the limits, but significantly longer than average, should be viewed as an indication of a systematic problem with control rod drives, especially if the number of drives exhibiting such scram times exceeds eight, the allowable number of inoperable rods.

3.3/43-10



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. 89
License No. DPR-30

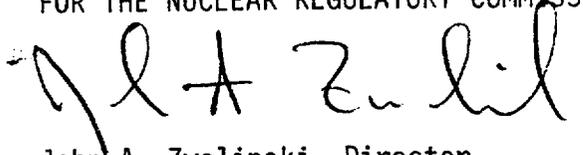
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Commonwealth Edison Company (the licensee) dated May 2, 1983, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and 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 2.C.(2) of Facility Operating License No. DPR-30 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 89, 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: February 7, 1986.

ATTACHMENT TO LICENSE AMENDMENT NO. 89

FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Pages

3.3/4.3-4

3.3/4.3-10

QUAD-CITIES
DPR-39

- c. the operating power level shall be limited so that the MCPR will remain above the MCPR fuel cladding integrity safety limit assuming a single error that results in complete withdrawal of any single operable control rod

C. Scram Insertion Times

1. The average scram insertion time, based on the deenergization of the scram pilot valve solenoids at time zero, of all operable control rods in the reactor power operation condition shall be no greater than:

<i>% Inserted From Fully Withdrawn</i>	<i>Average Scram Insertion Times (sec)</i>
5	0.375
20	0.900
50	2.00
90	3.50

The average of the scram insertion times for the three fastest control rods of all groups of four control rods in a two by two array shall be no greater than:

<i>% Inserted From Fully Withdrawn</i>	<i>Average Scram Insertion Times (sec)</i>
5	0.398
20	0.954
50	2.12
90	3.80

2. The maximum scram insertion time for 90% insertion of any operable control rods shall not exceed 7 seconds.
3. If Specification 3.3.C.1 cannot be met, the reactor shall not be made supercritical; if operating, the reactor shall be shut down immediately upon determination that average scram time is deficient.
4. If Specification 3.3.C.2 cannot be met, the deficient control rod shall be con-

C. Scram Insertion Times

1. After refueling outage and prior to operation above 30% power, with reactor pressure above 800 psig, all control rods shall be subject to scram-time measurements from the fully withdrawn position. The scram times for single rod scram testing shall be measured without reliance on the control rod drive pumps.

2. All control rod drives shall have experienced scram test measurements each year. Also, 50% of the control rod drives in each quadrant of the reactor core shall be measured for the scram times specified in Specification 3.3.C during the interval not more frequently than 16 weeks nor less frequently than 32 weeks. These tests shall be performed with a reactor pressure above 800 psig and may be measured during a reactor scram. Whenever all of the control rod drive scram times have been measured, an evaluation shall be made to

C. Scram Insertion Times

The control rod system is analyzed to bring the reactor subcritical at a rate fast enough to prevent fuel damage, i.e., to prevent the MCPR from becoming less than the fuel cladding integrity safety limit.

Analysis of the limiting power transient shows that the negative reactivity rates resulting from the scram with the average response of all the drives as given in the above specification, provide the required protection, and MCPR remains greater than the fuel cladding integrity safety limit. It is necessary to raise the MCPR operating limit (per Specification 3.5.K) when the average 20% scram insertion time reaches 0.73 seconds on a cycle-cumulative basis. (overall average of surveillance data to date) in order to comply with assumptions in the implementation procedure for the ODYN transient analysis computer code. The basis for choosing 0.73 seconds is discussed further in the bases for Specification 3.5.K. In the analytical treatment of the transients, 290 milliseconds are allowed between a neutron sensor reaching the scram point and the start of motion of the control rods. This is adequate and conservative when compared to the typically observed time delay of about 210 milliseconds. Approximately 90 milliseconds after neutron flux reaches the trip point, the pilot scram valve solenoid deenergizes and 120 milliseconds later the control rod motion is estimated to actually begin. However, 200 milliseconds rather than 120 milliseconds is conservatively assumed for this time interval in the transient analyses and is also included in the allowable scram insertion times specified in Specification 3.3.C.

The scram times for all control rods will be determined at the time of each refueling outage. A representative sample of control rods will be scram tested during the interval of greater than 16 weeks but not more than 32 weeks

Scram times of new drives are approximately 2.5 to 3 seconds; lower rates of change in scram times following initial plant operation at power are expected. The test schedule provides reasonable assurance of detection of slow drives before system deterioration beyond the limits of Specification 3.3.C. The program was developed on the basis of the statistical approach outlined below and judgment.

The history of drive performance accumulated to date indicates that the 90% insertion times of new and overhauled drives approximate a normal distribution about the mean which tends to become skewed toward longer scram times as operating time is accumulated. The probability of a drive not exceeding the mean 90% insertion time by 0.75 seconds is greater than 0.999 for a normal distribution. The measurement of the scram performance of the drives surrounding a drive exceeding the expected range of scram performance will detect local variations and also provide assurance that local scram time limits are not exceeded. Continued monitoring of other drives exceeding the expected range of scram times provides surveillance of possible anomalous performance.

The numerical values assigned to the predicted scram performance are based on the analysis of the Dresden 2 startup data and of data from other BWR's such as Nine Mile Point and Oyster Creek.

The occurrence of scram times within the limits, but significantly longer than average, should be viewed as an indication of a systematic problem with control rod drives, especially if the number of drives exhibiting such scram times exceeds eight, the allowable number of inoperable rods.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 92 TO FACILITY OPERATING LICENSE NO. DPR-29
AND AMENDMENT NO. 89 TO FACILITY OPERATING LICENSE NO. DPR-30

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

QUAD CITIES STATION, UNITS 1 AND 2

DOCKET NOS. 50-254/265

1.0 INTRODUCTION

During the inspection period May 9 - June 5, 1981, as reported in an Inspection Report for Quad Cities 1 and 2 dated July 16, 1981, the NRC's resident inspector noted that Commonwealth Edison Company (licensee) fulfilled the requirement of Technical Specification 4.3.C.1, which states that "after each refueling outage and prior to operation with reactor pressure above 800 psig, all control rods shall be subject to scram time tests from the fully withdrawn position", by performing the testing with the reactor depressurized. It was the inspectors' opinion that the wording of 4.3.C.1 would be better interpreted to mean that the tests should be performed above 800 psig but before power operation. Following a review, the staff proposed that the test should be conducted while the reactor pressure is greater than 800 psig and prior to exceeding 950 psig. It was also agreed that scram time tests would be conducted prior to exceeding 30% of the reactor licensed power following a refueling outage. In two letters dated May 2, 1983 the licensee proposed Technical Specification (TS) changes to clarify this procedure for both the Dresden 2/3 units and the Quad Cities 1/2 units. In the same submittal the licensee also requested TS changes that allowed Control Rod Drive (CRD) pumps to be isolated only during single rod scram testing. This request was based on a proposed purchase of equipment that would allow multiple scram testing; e.g. during any reactor scram. It is the licensee's position that during full core testing there is insufficient charging system capacity to bias scram insertion times and that the current BWR Standard Technical Specifications reflect this distinction.

2.0 EVALUATION

Based on an analysis of the proposed procedures for scram time testing following a refueling outage, the staff has determined that such testing should be conducted with the reactor pressure above 800 psig but before the pressure exceeds 950 psig. The tests should also be performed before exceeding 30% of the reactor licensed power. The changes proposed by the

8602180261 860207
PDR ADOCK 05000254
P PDR

licensee reflect these staff determinations and are, therefore, acceptable. The staff also agrees, after a technical review and a consideration of the BWR Standard Technical specifications, that the request to have the CRD pumps isolated only during single rod scram testing meets staff criteria and is, therefore, acceptable.

Thus, the staff finds that the licensee's proposal to improve the wording of Technical Specification Sections 4.3.C.1 and 4.3.C.2 for Quad Cities Units 1 and 2 to reflect the staff's position, as stated above, is acceptable.

3.0 ENVIRONMENTAL CONSIDERATIONS

The amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in 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 the 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 or environmental assessment need be prepared in connection with the issuance of the amendments.

4.0 CONCLUSION

We have 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 or to the health and safety of the public.

Principal Contributor: R. Bevan and R. Gilbert.

Dated: February 7, 1986.