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 DENTON, H.R. OFFICE OF NUCLEAR REACTOR REGULATION

DOCKET #
05000331

SUBJECT: Forwards appl (not encl) to amend subj Facil Lic re Tech
 Specs Measured Scam Time & Transient Reclassification.
 Forwards rept, & suppl in preparation for Reload-3(Cycle 4)
 Lic Amend re Safety Analysis For Reclassified Events/
W/CHECK FOR \$4,000.00. (see topicals)

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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office
CEDAR RAPIDS, IOWA

IE-78-1879
December 27, 1978

LEE LIU
SENIOR VICE PRESIDENT — ENGINEERING

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulations
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

Transmitted herewith in accordance with the requirements of 10 CFR 50.59 and 50.90 is an application for amendment of DPR-49 and the Technical Specifications (Appendix A to License) for the Duane Arnold Energy Center (DAEC).

This application consists of two changes in Technical Specifications which will facilitate operation of the DAEC throughout Cycle 4 without derate. Approval of the enclosed changes four months after resumption of operation is requested. These changes supercede RTS-102 and RTS-107. The changes are:

- (1) Application of Measured Scram Times (RTS-113); and
- (2) Reclassification of Transients Involving Failure of the Turbine Bypass System (RTS-114).

This application assumes the use of MCPR limits derived from the present licensing bases (REDY). This application also assumes the approval of RTS-109 which was submitted June 21, 1978. The approval of either of the proposed limits will allow the DAEC to operate at full power through Cycle 4. At the request of your staff, we are including Δ CPR's derived from REDY and ODYN analyses in Table 1. We are also including Δ CPR results for the combined application of Measured Scram Time and Reclassification.

Enclosed with this application, for each change is:

- (1) A completed supplement to the DAEC Cycle 4 License Amendment with a detailed description of the option and transient analysis results; and
- (2) Proposed Technical Specification changes.

Also provided as an Appendix to each amendment, per the NRC staff's request, are results of duplicate transient analyses for the limiting rapid pressurization transients performed with the ODYN code which is currently under review by the NRC staff.

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Mr. Harold Denton
IE-78-1879
Page Two

Although Iowa Electric desires approval of both measured scram time and reclassification, we understand, based on discussions with your Staff, that the review for these two items will probably require differing review times. We have therefore split this Application into two proposed changes to the Technical Specifications. In order to gain maximum benefit from these margin improvements, it is desirable that new Technical Specification operating limits be issued as soon as each facet of this application receives NRC approval.

These changes do not result in any change for the presently licensed safety limit MCPR 1.06.

This application has been reviewed and approved by the DAEC Operations Committee and DAEC Safety Committee. This application does not involve a significant hazards consideration.

We have determined that this is a Class III Amendment proposal in that it consists of more than one safety item. Accordingly, a check in the amount of \$4,000 is enclosed.

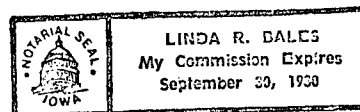
Three signed and notarized originals and thirty-seven additional copies of this Application are submitted herewith. This application consisting of the foregoing letter and enclosures hereto is true and accurate to the best of my knowledge and belief.

IOWA ELECTRIC LIGHT AND POWER COMPANY

BY: *Lee Liu*
Lee Liu
Senior Vice President, Engineering

SWORN TO AND SUBSCRIBED BEFORE ME this the 28th day of December, 1978.

Linda R. Bales
Notary Public in and for Linn County, Iowa



LL/KM/sc
Attachments
cc: K. Meyer
D. Arnold
R. Lowenstein
H. Rehrauer
R. Clark (NRC)
A-117, J-60a

TABLE 1

DAEC END OF CYCLE 4

SUMMARY OF RESULTS OF LIMITING ABNORMAL
OPERATIONAL TRANSIENTS WITH MARGIN IMPROVEMENTS

8 x 8 FUEL

7 x 7 FUEL

MEASURED SCRAM TIME

	REDY	ODYN	REDY	ODYN
LRNBP	.14	.20	.09	.15
TTNBP	.13	N/A	.09	N/A
FWCF	.09	.17	.06	N/A
LOFWH	.15		.14	
RWE	.11		.16	

RECLASSIFICATION

	REDY	ODYN	REDY	ODYN
LRBP	.13	.16	.09	.11
TTBP	.12	.14	.08	.11
FWCF	.19	.20	.13	.15
LOFWH	.15		.14	
RWE	.11		.16	

MEASURED SCRAM TIME AND RECLASSIFICATION

	REDY	ODYN	REDY	ODYN
LRBP	.03	<.16	.01	<.11
TTBP	.03	<.14	.01	<.11
FWCF	.09	.17	.06	N/A
LOFWH	.15		.14	
RWE	.11		.16	

PROPOSED CHANGE RTS-113 TO DAEC TECHNICAL SPECIFICATIONS

I. Affected Technical Specifications

Appendix A of the Technical Specifications for the DAEC (DPR-49) provides as follows:

Specification 3.3.C, Scram Insertion Times, provides average scram insertion times for various rod positions and supporting bases.

Table 3.12-2 provides MCPR limits for 7 x 7 and 8 x 8 fuel.

II. Proposed Changes in Technical Specifications

The licensees of DPR-49 propose the following changes in the Technical Specifications set forth in I above:

Delete pages 3.3-6, 3.3-17 through 3.3-23, and 3.12-9a and replace with the attached pages. The previous contents of sheet 3.3-23 were moved to page 3.3-19. Page 3.3-20 through 3.3-23 are deleted from the Technical Specifications.

III. Justification for Proposed Change

This change is proposed in order to provide operating margin improvements for DAEC. The safety analysis for these proposed changes is contained in NEDO-24087-3, 78 NED 265, Class 1, June 1978, "General Electric Boiling Water Reactor Reload 3 (Cycle 4) Licensing Amendment For Duane Arnold Energy Center, Supplement 3: Application of Measured Scram Insertion Times".

IV. Review Procedure

This proposed change has been reviewed by the DAEC Operations Committee and Safety Committee which have found that this proposed change does not involve a significant hazards consideration.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

C. Scram Insertion Times

1. Two specifications for scram insertion time are provided. If the most recent available scram time data set meets Specification 3.3.C.2, the operating MCPFR limit shall be as given in Table 3.12-2a. If the most recent available scram time data set does not meet Specification 3.3.C.2 but does meet Specification 3.3.C.3, the operating MCPFR limit shall be as given in Table 3.12-2b.
2. For application of the operating MCPFR limits as specified in Table 3.12-2a, scram insertion time shall be as follows:
 - a. The average scram insertion time, based on the de-energization of the scram pilot valve at time zero, of all operable control rods in the reactor power operation condition shall be no greater than:

<u>Rod Position</u>	<u>Average Scram Insertion Times (Sec)</u>
46	0.361
36	0.917
26	1.468
06	2.686

- b. The average scram insertion times for the three fastest control rods of all groups of four control rods in a 2 x 2 array shall be no greater than:

<u>Rod Position</u>	<u>Average Scram Insertion Times (Sec)</u>
46	0.383
36	0.972
26	1.556
06	2.847

C. Scram Insertion Times

1. After each refueling outage all operable rods shall be scram time tested from the fully withdrawn position with the nuclear system pressure above 950 psig (with saturation temperature) and the requirements of Specification 3.3.B.3.a met. This testing shall be completed prior to exceeding 40% power. Below 30% power, only rods in those sequences (A₁₂ and A₃₄ or B₁₂ and B₃₄) which were fully withdrawn in the region from 100% rod density to 50% rod density shall be scram time tested. During all scram time testing below 30% power, the Rod Worth Minimizer shall be operable or a second licensed operator shall verify that the operator at the reactor console is following the control rod program.

Whenever such a test is required, the test shall be performed as soon as possible after the reactor has been brought to a stable operating condition. The test shall be performed at a power level of 30% or less. The test shall be performed at a power level of 30% or less. The test shall be performed at a power level of 30% or less.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

3. For application of the operating MCPR limits as specified in Table 3.12-2b scram insertion times shall be as follows:

a. The average scram insertion time, based on the de-energization 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:

<u>Rod Position</u>	<u>Average Scram Insertion Times (Sec)</u>
46	0.37
36	1.10
26	1.87
06	3.41

b. The average of the scram insertion times for the three fastest control rods of all groups of four control rods in a 2 x 2 array shall be no greater than:

<u>Rod Position</u>	<u>Average Scram Insertion Times (Sec)</u>
46	0.39
36	1.17
26	1.98
06	3.62

c. The operating MCPR limits specified in Table 3.12-2a shall not be applied unless the scram insertion time specification in 3.3.C.2 is met.

4. Maximum scram insertion time for 90% insertion of any operable control rod should not exceed 7.00 seconds.

bypassed from the console for maintenance and/or testing. Tripping of one of the channels will block erroneous rod withdrawal soon enough to prevent fuel damage. This system backs up the operator who withdraws control rods according to written sequences. The specified restrictions with one channel out of service conservatively assure that fuel damage will not occur due to rod withdrawal errors when this condition exists.

A limiting control rod pattern is a pattern which results in the core being on a thermal hydraulic limit [MCP_R = 1.40 (7 x 7 array) or 1.50 (8 x 8 array) and LHGR = 18.5 KW/ft (7 x 7 array) or 13.4 KW/ft (8 x 8 array)]. During use of such patterns, it is judged that testing of the RBM system prior to withdrawal of such rods to assure its operability will assure that improper withdrawal does not occur. It is the responsibility of the Reactor Engineer to identify these limiting patterns and the designated rods either when the patterns are initially established or as they develop due to the occurrence of inoperable control rods in other than limiting patterns. Other personnel qualified to perform this function may be designated by the DAEC Chief Engineer.

3. Scram Insertion Times

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

Two sets of scram insertion time specifications are provided:

- a. That specified in Section 3.3.C.2 is based on analysis of data from DAEC and other plants with the same control drives and is the mean of this data plus a conservatism of approximately three standard deviations. When this specification is met, the operating MCPR limits given in Table 3.12-2a may be applied. Analysis of the most limiting transient under these conditions shows that MCPR remains greater than the safety limit.
- b. That specified in Section 3.3.C.3 is for use if Specification 3.3.C.2 cannot be met and the operating MCPR limits in Table 3.12-2a cannot be applied. If only the specification in Section 3.3.C.3 can be met, only the operating MCPR limits specified in Table 3.12-2b are to be used. Analysis of the most limiting transient under these conditions shows that MCPR remains greater than the safety limit.

After initial fuel loading and subsequent refuelings when operating above 950 psig, all control rods shall be scram tested within the constraints imposed by the Technical Specifications and before the 40% power level is reached.

The requirements for the various scram time measurements ensure that any indication of systematic problems with rod drives will be investigated on a timely basis.

4. Reactivity Anomalies

During each fuel cycle excess operative reactivity varies as fuel depletes and as any burnable poison in supplementary control is burned. The magnitude of this excess reactivity may be inferred from the critical rod configuration. As fuel burnup progresses, anomalous behavior in the excess reactivity may be detected by comparison of the critical rod pattern at selected base states to the predicted rod inventory at that state. Power operating base conditions provide the most sensitive and directly interpretable data relative to core reactivity. Furthermore, using power operating base conditions permits frequent reactivity comparisons.

Requiring a reactivity comparison at the specified frequency assures that a comparison will be made before the core reactivity change exceeds $1\% \Delta k$. Deviations in core reactivity greater than $1\% \Delta k$ are not expected and require thorough evaluation. One percent reactivity limit is considered safe since an insertion of the reactivity into the core would not lead to transients exceeding design conditions of the reactor system.

TABLE 3.12-2

MCPR LIMITS

TABLE 3.12-2a

(For application only if scram time Specification 3.3.C.2 is met)

<u>Fuel Type</u>	
7 x 7	1.22
8 x 8	1.21

TABLE 3.12-2b

(For application if scram time Specification 3.3.C.2 is not met)

<u>Fuel Type</u>	<u>Exposure Remaining to End of Cycle</u>			
	<u>B.O.C. to</u> <u>>2000 MWD/T</u>	<u>≤ 2000 MWD/T</u> <u>to > 1000 MWD/T</u>	<u>≤ 1000 MWD/T</u> <u>to > 500 MWD/T</u>	<u>≤ 500 MWD/T</u> <u>to E.O.C.</u>
7 x 7	1.22	1.22	1.26	1.30
8 x 8	1.21	1.29	1.34	1.38

PROPOSED CHANGE RTS-114 TO DAEC TECHNICAL SPECIFICATIONS

I. Affected Technical Specifications

Appendix A of the Technical Specifications for the DAEC (DPR-49) provides as follows:

Table 3.12-2 provides MCPR limits applicable for Cycle 4 operation.

II. Proposed Changes in Technical Specifications

The licensees of DPR-49 propose the following changes in the Technical Specifications set forth in I above:

Change the MCPR limits for 7 x 7 and 8 x 8 fuel as shown on the attached sheet.

III. Justification for Proposed Change

This change is proposed in order to incorporate the results of analyses obtained from the turbine trip combined with bypass system failure study. The results of this study are contained in NEDO-24087-4, 78 NED 272, Class 1, June 1978, General Electric Boiling Water Reactor Reload 3 (Cycle 4) Licensing Amendment For Duane Arnold Energy Center Supplement 4: Safety Analysis For Reclassified Events.

IV. Review Procedure

This proposed change has been reviewed by the DAEC Operations Committee and Safety Committee which have found that this proposed change does not involve a significant hazards consideration.

TABLE 3.12-2

MCPR LIMITS

(For application only if Specification 3.3.C.2 is met)

<u>Fuel Type</u>	<u>MCPR Limits</u>
7 x 7	1.22
8 x 8	1.21

(For application only if Specification 3.3.C.2 is not met)

<u>Fuel Type</u>	<u>MCPR Limits</u>	
	<u>BOC \leq 2000</u>	<u>$>$ 2000 - EDC</u>
7 x 7	1.22	1.22
8 x 8	1.21	1.25