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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office CEDAR RAPIDS.IOWA March 15, 1977 IE-77-551

LEE LIU VICE PRESIDENT - ENGINEERING

> Mr. Benard C. Rusche, Director Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, D.C. 20545



In accordance with 10CFR50.59 and 50.90, we transmitted our application dated January 31, 1977 for amendment of DPR-49 and the Technical Specifications for the Duane Arnold Energy Center for Cycle 3 operational limits and safety limits. We hereby amend the application to include proposed Technical Specifications for the Recirculation Pumps (RTS-82).

Also included with this submittal are responses to questions 1, 3, 4, and 5 contained in your February 28, 1977 Request for Additional Information. A response to Question 2 should be forwarded in about one week.

The amendment to the Technical Specifications has been reviewed and approved by the DAEC Operations Committee and DAEC Safety Committee and does not involve significant hazards considerations.

Three signed and notarized originals and 40 additional copies of this submittal are transmitted herewith.

This submittal, 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:	Vic
L	ee Liu
٧	ice President, Engineering
Subsc	cribed and Sworn to before me on
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September 30, 1979

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LL/KAM/ms Encls.

- cc: K. Meyer D. Arnold R. Lowenstein J. Shea (NRC)
 - L. Root
 - File J-60a

PROPOSED CHANGE RTS-82 TO DAEC TECHNICAL SPECIFICATIONS

I. Affected Technical Specifications

Appendix A of the Technical Specifications for the DAEC (DPR-49) does not provide adequately for all phases of Recirculation Pump operation.

II. Proposed Change in Technical Specifications

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

Change existing Specification "3.3.E" to "3.3.F".

Add new Specification 3.3.E as follows:

"<u>Recirculation Pumps</u> - A recirculation pump shall not be started while the reactor is in natural circulation flow and reactor power is greater than 1% of rated thermal power."

III. Justification for Proposed Change

This proposed change is being submitted in response to a request from the Nuclear Regulatory Commission for additional information required to evaluate fuel cycle 3. (Letter; Mr. G. Lear, Chief, Operating Reactors Branch #3, to Mr. D. Arnold, President, Iowa Electric Light and Power Company; February 28, 1977.)

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.

DAEC-1

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

PAGE NO.

1.0 Definitions

1.0-1

	<u>s</u>	AFETY LIMITS	LIMITING SAFETY SYSTEM SETTING	
1.1	Fuel C	ladding Integrity	2.1	1.1-1
1.2	Reacto Integr	r Coolant System ity	2.2	1.2-1
LI	MITING	CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENTS	
3.1	Reacto	r Protection System	4.1	3.1-1
3.2	Protect	tive Instrumentation	4.2	3.2-1
3.3	Reactiv	vity Control	4.3	3.3-1
	A. Rea	activity Limitations	A	3.3-1
	B. Cor	trol Rods	В	3.3-3
×	C. Sci	cam Insertion Times	С	3.3-6
3.4	E. Rec	Activity Anomalies irculation Pumps V Liquid Control System	D E 4.4	3.3-7 3.3-7 3.4-1
	A. Nor	mal System Availability	A	3.4-1
	B. Ope Com	ration with Inoperable ponents	В	3.4-2
	C. Sod	ium Pentaborate Solution	С	3.4-2
3.5	Core an Systems	d Containment Cooling	4.5	3.5-1
	A. Cor	e Spray and LPCI Subsyst	ems A	3.5-1
	B. Con bil	tainment Spray Cooling C ity	apa- B	3.5-4

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3.3.D Reactivity Anomalies

The reactivity equivalent of the difference between the actual critical rod configuration and the expected configuration during power operation shall not exceed $1\% \Delta k$. If this limit is exceeded, the reactor will be shut down until the cause has been determined and corrective actions have been taken as appropriate.

E. <u>Recirculation</u> Pumps

A recirculation pump shall not be started while the reactor is in natural circulation flow and reactor power is greater than 1% of rated thermal power.

F. If Specifications 3.3.A through D above cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the Cold Shutdown condition within 24 hours.

SURVEILLANCE REQUIREMENTS

4.3.D <u>Reactivity Anomalies</u>

During the startup test program and startup following refueling outages, the critical rod configurations will be compared to the expected configurations at selected operating conditions. These comparisons will be used as base data for reactivity monitoring during subsequent power operation throughout the fuel cycle. At specific power operating conditions, the critical rod configuration will be compared to the configuration expected based upon appropriately corrected past data. This comparison will be made at least every full power month.

3.3-7

Question 1:

Provide a quantitative discussion of the Δ CPR's given in Table 6-3 NEDO 21082-2.

RESPONSE:

Cycle 2 and Cycle 3 void coefficients and Δ CPR's are as follows:

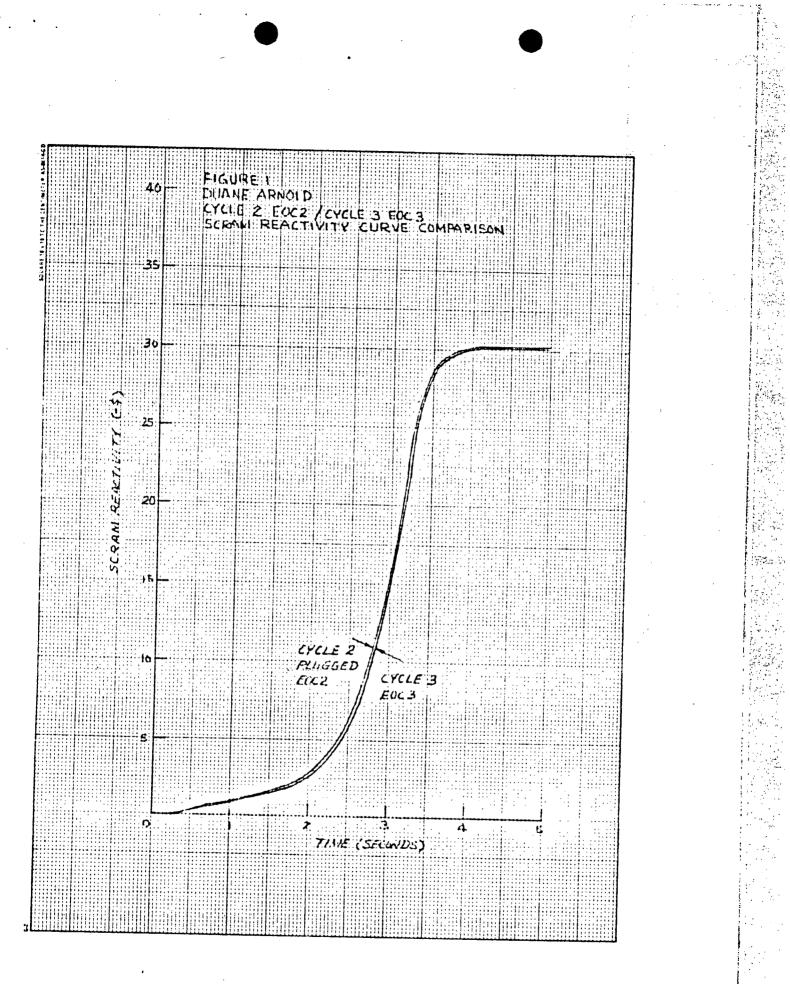
		-	-	$\Delta \underline{CPR}$	
		<u>v.c.</u>	· · · · · ·	<u>8x8</u>	<u>7x7</u>
EOC ²		-14.36	¢/%	0.37	0.28
EOC2	-lgwd/T	-16.93	¢/%	0.27	0.19
EOC2	-2GWD/T	-16.88	¢/&	0.23	0.17
•					

		$\Delta \underline{CPR}$	
	V.C.	<u>8x8</u>	<u>7x7</u>
EOC3	-13.27 ¢/%	0.37	0.27
EOC3-lGWD/T	-14.47 ¢/%	0.36	0.28
EOC3-2GWD/T	-14.40 ¢/%	0.29	0.21

Smaller void coefficients in Cycle 3 are expected to result in \triangle CPR's that are lower than Cycle 2 which has higher void coefficients. However, scram reactivity degradation experienced in Cycle 3 more than compensated for the benefit of improvement in the void coefficients. Figure 1, 2, 3 show the degradation in the scram reactivity between Cycle 2 and Cycle 3 exposure points

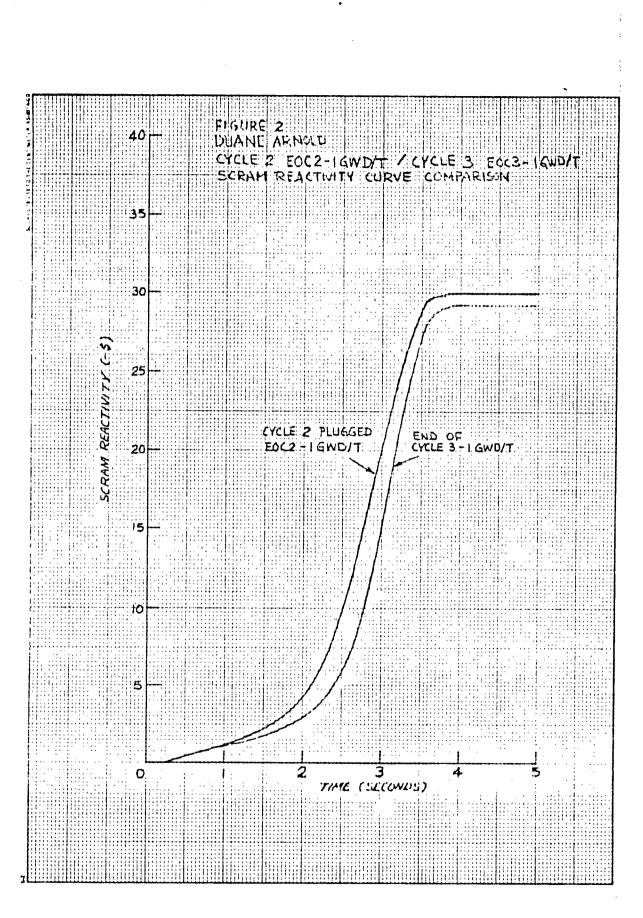
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analyzed. Note that Figures 1, 2, 3 are based on the same data submitted in the licensing submittals, minor variations may exist due to variations in replotting and scaling.



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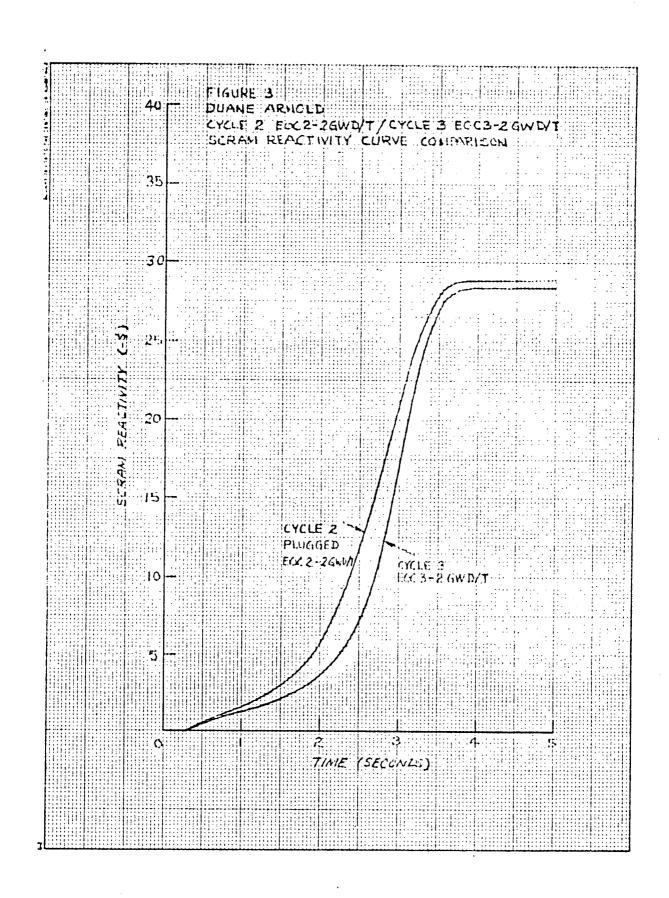
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-5-

Question 3:

Provide analyses and results of any test previously conducted which demonstrate that recirculation pump startup from the natural circulation mode does not cause a reactivity insertion transient in excess of the most severe coolant flow increase currently analyzed. The startup test results shall quote reactivity insertions observed during reactor startup for conditions of recirculation pump startup from natural circulation modes. This concern can be addressed either by the analyses and test data described above, or by a proposed technical specification change which precludes operation with natural circulation flow.

DAEC

RESPONSE:

Proposed Technical Specification Change RTS-82 transmitted herewith addresses the concern.

-6-

Question 4:

Provide a list and briefly describe each physics startup test to be performed for the Cycle 3 reload. Also provide the acceptance criterion for each test and discuss how the measured parameter(s) relates to the values in the accident analysis.

RESPONSE:

The following physics tests will be conducted at DAEC after the refueling outage:

- A) Scram Insertion Time Tests: This test satisfies the requirements of Technical Specifications Section 4.3.C. The acceptance criteria are as stated in Technical Specifications 3.3.C. The scram insertion times acceptance criteria is used in the derivation of the scram reactivity curves.
- B) Shutdown Margin Test: This test satisfies the requirements of Technical Specifications Section 4.3.A. The acceptance criteria is contained in the above Technical Specification. This test also fulfills the requirements in Paragraph C below by the acceptance criteria of ± 1 % Δ K being applied to this test. This test verifies acceptable shutdown margin as stated in NEDO 21082-02.
- C) Reactivity Anomolies Check: This test satisfies the requirements of Technical Specifications Section

-7-

C) Continued

4.3.D. The acceptance criteria is as stated in Technical Specifications Section 3.3.D. This test is normally conducted at 80% power and 100% flow. The number of control rod positions inserted into the core are plotted versus exposure and compared to the ± 1 % Δ K band. This verifies that reactivity of the core and control rods is within the band of values used in NEDO 21082-02.

- D) LPRM Instrument Calibration: This test is not a required post refueling check, however, work is normally accomplished on the LPRM's during refueling which does require LPRM calibration. LPRM maintenance requiring recalibration is planned during the Spring 1977 refueling outage. This test satisfies the requirements of the Technical Specifications Section 4.1.A pertaining to LPRM and APRM calibration (Table 4.1-2).
- E) Control Rod Drive Friction Testing and Insert/Withdraw Timing: Each control rod is friction tested and the insert/withdraw timing checked. This testing is conducted at zero pressure. The criteria is as follows:

-8-

E) Continued

 Each CRD must have a normal insert or withdraw of 3.0± 0.6 inches per second, indicated by a full 12 foot stroke in 40 to 60 seconds.

DAEC

- 2) Friction tests: If the differential pressure exceeds 25 psid for a continuous drive in, a settling test must be performed. For a settling test the differential settling pressure should not be less than 30 psid nor should it vary more than 10 psid over a full stroke.
- Core Power Distribution Symmetry Test: This test F) determines the magnitude and location of indicated core power distribution asymmetrics. This is accomplished by comparing symmetric integrated TIP data collected in conjunction with full core TIP sets. The acceptance criteria is that maximum deviation between integrated powers of symmetrical TIP strings are less than 20% and the average deviation is less than 6%. This criteria is based on initial startup test instructions. This test may only be accomplished if initial operation is in the "A" sequence which ensures octant symmetry and control.

-9-

G) Power Distribution Test: This test will be conducted at core thermal power greater than 50% of rated and at or near rated core flow with equilibrium xenon. The axial power distribution will be evaluated using the neutron monitoring system. The measured distribution will be compared to a predicted distribution supplied by General Electric Company. Measured and predicted values, and the percent difference will be recorded. Ouestion 5:

State your schedule for submitting to NRC a brief summary report of physics startup tests. This report should include both measured and predicted values. If the difference between the measured and predicted values exceeds the acceptance criterion, the report should discuss the actions that were taken and justify the adequacy of these actions.

DAEC

RESPONSE:

It does not appear that the Technical Specifications require a report, however, Iowa Electric will submit a brief summary report of the above tests as requested. Section 6.11.1.a of the Technical Specifications specifies 90 days after return to power for submission of Startup Test results which we shall use as guidance. The report will include the requested information.