



Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

January 9, 1985

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

Subject: Byron Generating Station Units 1 and 2
Braidwood Generating Station Units 1 and 2
Startup Test Program
NRC Docket Nos. 50-454, 50-455, 50-456,
and 50-457

Dear Mr. Denton:

This letter provides an advance copy of FSAR revisions relating to the startup test program described in the Byron/Braidwood FSAR. These changes appear to require NRC review before implementation as described in License Condition C.2(3)(c) of the Byron Operating License, NPF-23. If such approval is necessary, immediate consideration is requested.

Enclosed is a revised response to FSAR question 423.25, correspondingly revised FSAR sections 14.2.5 and 14.2.11, and a new FSAR table 14.2-91. These changes establish deadlines, in terms of power level, for review and approval of specific startup tests. This will permit reactor testing to proceed to higher power levels while certain test results are reviewed. The overall startup sequence is thereby shortened and some schedule pressure is removed from the test review process.

The test review deadlines were established on the basis of information provided in Attachment A to this letter which is proprietary to Westinghouse. It is requested that Attachment A be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations. An affidavit from Westinghouse supporting this request is being prepared and will be submitted within a few days. Correspondence with respect to the proprietary aspects of this matter should reference CAW-84-111 and should be directed to R. A. Wieseman, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, PA, 15230. A non-proprietary version of Attachment A is provided in Attachment B.

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H. R. Denton

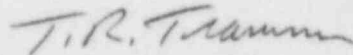
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Please direct further questions regarding this matter to this office.

One signed original and fifteen copies of this letter, the enclosures, and Attachment B are provided for NRC review. Five copies of the proprietary Attachment A are also provided.

Very truly yours,



T. R. Tramm
Nuclear Licensing Administrator

lm

cc: Byron Resident Inspector (w/proprietary Attachment A)

Attachments

9601N

QUESTION 423.25

"The information contained in Subsections 14.2.5. and 14.2.11 is inconsistent. Revise the subsections as follows:

1. State that all preoperational tests will be completed, evaluated, and approved prior to core load.
2. State that all startup test data obtained at each power test plateau will be evaluated and approved before increasing power level."

RESPONSE

1. All preoperational tests will be completed, evaluated, and approved prior to core load. Subsections 14.2.5 and 14.2.11 have been revised to include these commitments.
2. All startup test data obtained at each power test plateau will be evaluated and approved before increasing power level, ~~Subsections 14.2.5 and 14.2.11 have been revised to include these commitments.~~

with exceptions as noted in Table 14.2-91 of the FSAR. Subsections 14.2.5 and 14.2.11 have been revised to include these commitments.

prerequisites have been completed. Test personnel will be instructed to initial and date the prerequisites included in each test procedure. Data will be examined as each test proceeds and out-of-tolerance conditions will be recorded and described in adequate detail to permit post-test analysis. Test data that is unsuccessful will be recorded, evaluated during post-test review, and resolved within the Quality Assurance program.

14.2.5 Review, Evaluation, and Approval of Test Results

Initial preoperational and startup tests that fall within the scope of the Quality Assurance program will be subject to two stages of evaluation. First, a detailed and comprehensive review by station startup personnel will be made. The Project Engineering Department project personnel will perform a second and final review and evaluation. Modifications or rework of systems or equipment required to resolve deficiencies will be accomplished in accordance with controlled procedures. Retesting, if required because of modification or rework, will be documented and filed with the initial test record.

The initial core loading procedure will specify the startup tests that must be completed prior to commencement of fuel load. All testing identified as falling within the pre-operational test phase will be completed and the results evaluated prior to core load.

Modification and rework on systems that is required to resolve test deficiencies is controlled by the Test Review Board during post test review and by Project Engineering who has responsibility for final test acceptance and approval. Project Engineering may specify additional test requirements to resolve test deficiencies prior to final test approval.

The power ascension procedure will specify those startup tests or portions of startup tests that must be completed as a prerequisite for commencing each phase. The data obtained at each power test plateau will be evaluated and approved before increasing power level, *with exceptions as noted in Table 14.2-91.*

14.2.6 Test Records

The initial startup test procedures and test data will be retained and maintained in accordance with the Quality Assurance program described in Chapter 17.0. The original test records will be reviewed for completeness, identified, and indexed to establish them as part of a permanent record to be retained. These records will include data sheets completed during the test.

14.2.7 Conformance of Test Program with Regulatory Guides

Appendix A to the FSAR identifies those Regulatory Guides applicable to Byron/Braidwood and describes the anticipated degree of conformance to each.

Preoperational testing will proceed concurrently with construction testing as various systems reach completion and are turned over to the station startup staff. The principal milestones during this phase are expected to be the reactor coolant system hydrostatic test and the integrated hot functional test. The former test is expected to be accomplished approximately 10 months prior to fuel load. Hot functional testing is expected to begin about 3 months before fuel load. Tests of other systems will be scheduled as appropriate to support these tests. A schedule for testing is provided in Figure 14.2-1.

Individual preoperational tests will be conducted as early in the test program as practical and at no time will the safety of the plant be totally dependent on the performance of untested systems, components and features. Core load will occur only after the satisfactory completion and approval of all preoperational tests.

Individual startup tests will be conducted after core load and test data obtained at each power test plateau will be evaluated and approved prior to increasing power load, with exceptions as noted in Table 14.2-91.

Any initial test schedule overlap at the Byron and Braidwood Stations will not result in significant divisions of responsibility or dilutions in the staff provided to implement the test program.

Preoperational test procedure drafts will be available for review by I&E inspectors at least 60 days prior to their intended use and not less than 60 days prior to the core loading date for startup test procedure drafts.

TABLE 14.2-91 - TEST RESULTS REVIEW AND APPROVAL SCHEDULE DEFERRALS

PreCritical, Post CoreLoad

<u>Test No.</u>	<u>Title</u>	<u>Approval Before-</u>
2.63.32	RCS Flow Coastdown	>75% Power

Low Power ($\leq 5\%$ Power)

<u>Test No.</u>	<u>Title</u>	<u>Approval Before-</u>
2.64.33	Boron Endpoint	> 50% Power
2.47.30	Isothermal Temp. Coeff.	> 50% Power
2.45.31	Incore Flux Map	> 50% Power
2.64.30A	RCCA Bank Worth	> 50% Power
2.64.30B	Bank Worth Overlap	> 50% Power
2.45.33	RCCA Psuedo Rod Ejection	> 75% Power

30% Power

<u>Test No.</u>	<u>Title</u>	<u>Approval Before-</u>
2.52.37	Load Swing	> 75% Power
2.45.33	RCCA Psuedo Rod Ejection	> 75% Power
2.47.31	Power Coefficient	> 50% Power

50% Power

<u>Test No.</u>	<u>Title</u>	<u>Approval Before-</u>
2.64.36	RCCA Psuedo Rod Ejection	> 90% Power
2.45.32A	Flux Map	> 75% Power
2.45.32B	Flux Map	> 75% Power
2.45.32C	Flux Map	> 75% Power
2.63.31	RCS Flow Measurement	> 75% Power
2.52.30	Plant Trip	> 90% Power
2.47.31	Power Coefficient	> 75% Power

75% Power

<u>Test No.</u>	<u>Title</u>	<u>Approval Before-</u>
2.47.31	Power Coefficient	> 90% Power
2.52.37	Load Swing	> 90% Power
2.64.39	Large Load Reduction	> 90% Power

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ATTACHMENT B

Basis for Test Review Deadlines

Non-Proprietary Version

PROPRIETARY INFORMATION NOTICE

TRANSMITTED HERewith ARE PROPRIETARY AND/OR NON-PROPRIETARY VERSIONS OF DOCUMENTS FURNISHED TO THE NRC IN CONNECTION WITH REQUESTS FOR GENERIC AND/OR PLANT SPECIFIC REVIEW AND APPROVAL.

IN ORDER TO CONFORM TO THE REQUIREMENTS OF 10CFR2.790 OF THE COMMISSION'S REGULATIONS CONCERNING THE PROTECTION OF PROPRIETARY INFORMATION SO SUBMITTED TO THE NRC, THE INFORMATION WHICH IS PROPRIETARY IN THE PROPRIETARY VERSIONS IS CONTAINED WITHIN BRACKETS AND WHERE THE PROPRIETARY INFORMATION HAS BEEN DELETED IN THE NON-PROPRIETARY VERSIONS ONLY THE BRACKETS REMAIN, THE INFORMATION THAT WAS CONTAINED WITHIN THE BRACKETS IN THE PROPRIETARY VERSIONS HAVING BEEN DELETED. THE JUSTIFICATION FOR CLAIMING THE INFORMATION SO DESIGNATED AS PROPRIETARY IS INDICATED IN BOTH VERSIONS BY MEANS OF LOWER CASE LETTERS (a) THROUGH (g) CONTAINED WITHIN PARENTHESES LOCATED AS A SUPERSCRIPIT IMMEDIATELY FOLLOWING THE BRACKETS ENCLOSING EACH ITEM OF INFORMATION BEING IDENTIFIED AS PROPRIETARY OR IN THE MARGIN OPPOSITE SUCH INFORMATION. THESE LOWER CASE LETTERS REFER TO THE TYPES OF INFORMATION WESTINGHOUSE CUSTOMARILY HOLDS IN CONFIDENCE IDENTIFIED IN SECTIONS (4)(11)(a) THROUGH (4)(11)(g) OF THE AFFIDAVIT ACCOMPANYING THIS TRANSMITTAL PURSUANT TO 10CFR2.790(b)(1).

Phase 3 - Post Critical Testing

Concerning the time frame for evaluating specific test results, Westinghouse has emphasized those post critical tests which were related to safety/technical specifications parameters, in contrast to tests related to control system optimization and "historical tests". This was done in the interest of getting nuclear power plants on line in a reasonable and timely fashion.

To this end, a table relating tests, power level of testing, and recommended power level threshold for evaluation has been supplied to our Customers.

Table II-1 of our startup sequence document is attached.

The rationale for the recommendations made in Table II-1 derive from the fundamental parameters affecting NSSS core performance:

- 1) power distribution parameters F_Q , $F_{\Delta H}$, quadrant power tilt
- 2) primary heat removal parameters, flow, T_{avg} , ΔT_{vessel}
- 3) reactivity parameters, control bank worth, $\partial\rho/\partial T$, $\partial\rho/\partial C_B$

and the following transient characteristics:

- 1) reactor coolant pump trip/flow coastdown
- 2) normal load transients
- 3) large load transients/plant trips

The hot zero power tests yield the basic core neutronic performance results. In order to verify core neutronic performance, the basic measurements are an all rods out flux map, the reactivity worth of the first control bank, and the all rods out plus control bank in-moderator temperature coefficient. These measurements are evaluated promptly to confirm compliance with applicable technical specifications and extrapolate to the next power plateau for testing. From these tests it is confirmed that the power distribution parameters are within the design constraints for the plant. Subsequent power distribution measurements reveal the effect of doppler and xenon on power distribution. The hot zero power tests also yield the moderator temperature coefficient data which is used to determine the control bank withdrawal limit in order to comply with the technical specification on moderator temperature coefficient.

Measurements related to pseudo rod ejection have been shown over the years to yield data of no significance when compared with design margins. They have been kept in the test program simply because Regulatory Guide 1.68 calls for them. Recently, twin unit stations have succeeded in deleting these tests for Unit 2 with NRC concurrence. Based on results from many plants we feel the tests can be evaluated in the time frame shown on Table II-1.

To further amplify on the power ascension program, we are attaching Table 3.8 of our WCAP-7905, Revision 1. This WCAP has not been submitted for NRC review and approval and the Table is submitted for information only. This Table delineates the Westinghouse "Minimum Test Requirements For Power Escalation". It is based on considerations described above regarding the significance of test results to plant safety.

One further consideration. Westinghouse supplies an engineer during major testing plateaus to render technical assistance to the Customer as the tests are executed and evaluated. This engineer has resources at the Monroeville Nuclear Center for resolving any problems and in many cases doing parallel data analyses. Any anomalous test results are identified and resolved on a timely basis, following the Physics Test Acceptance criteria document.

TABLE II-1

Test Results Evaluation Schedule Exceptions

Page 1 of 2

Test Description	Reference Test Sequence		Test Performed at	Test Results Required Before Exceeding
	Number	Paragraph		
Reactor Coolant System Flow Measurement	3.1.3	5.3.3	Hot Shutdown	Before Initial Criticality
Reactor Coolant System Flow Cooldown	3.1.3	5.3.10	Hot Shutdown	+a,c
Low Power Nuclear Tests	3.1.4	5.4 thru 5.15	Low Power	
RCCA Pseudo Ejection (H2P Case)	3.1.4	5.16	Low Power	
RCCA Pseudo Ejection (HPP Case)	3.1.5	5.18	30%	
Load Swing	3.1.5	5.19	30%	
Power Coefficient	3.1.5	5.21	30%	
RCCA Pseudo Drop	3.1.6	5.8 except 5.8.5	50%	
M/D Flux Map	3.1.6	5.8.5	50%	
Roda Drop and Plant Trip	3.1.6	5.12	50%	

II-3

CVA-SU-3.1.1
7/28/83
Revision 2

WESTINGHOUSE PROPRIETARY CLASS 3

Test Description	Reference Test Sequence		Test Performed at	Test Results Required Before Exceeding
	Number	Paragraph		
Power Coefficient	3.1.6	5.9	50%	<div style="border: 1px solid black; width: 100px; height: 100px; display: flex; align-items: center; justify-content: center;"> +a,c </div>
Power Coefficient	3.1.7	5.8	75%	
Load Swing	3.1.7	5.9	75%	
Large Load Reduction	3.1.7	5.10	75%	
Reactor Coolant System Flow Measurement	3.1.6		50%	

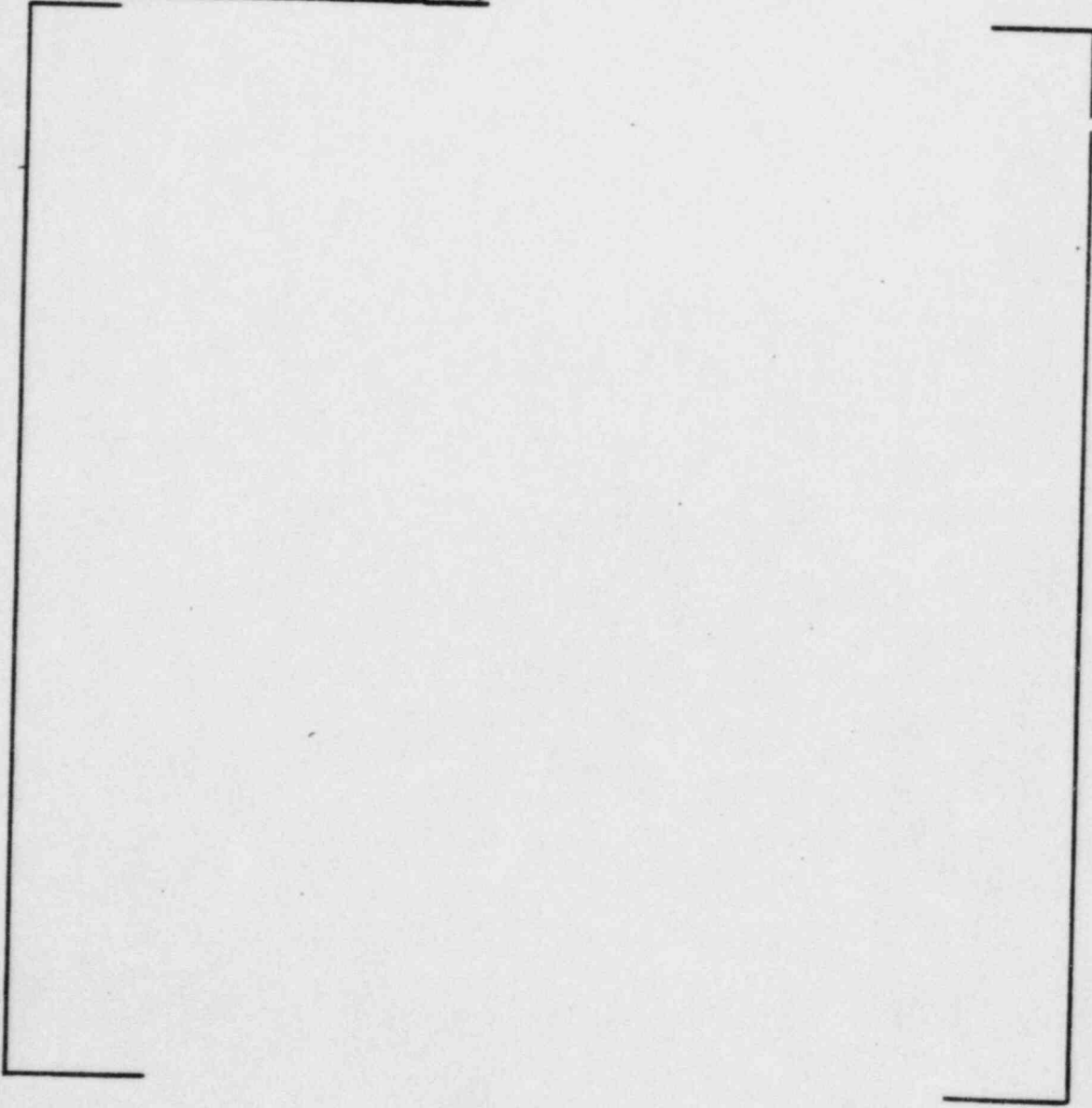
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TABLE 3.8

MINIMUM TEST REQUIREMENTS FOR POWER ESCALATION

(These Criteria Assume That All Safety Related
Preoperational Tests Have Been Performed Satisfactorily)

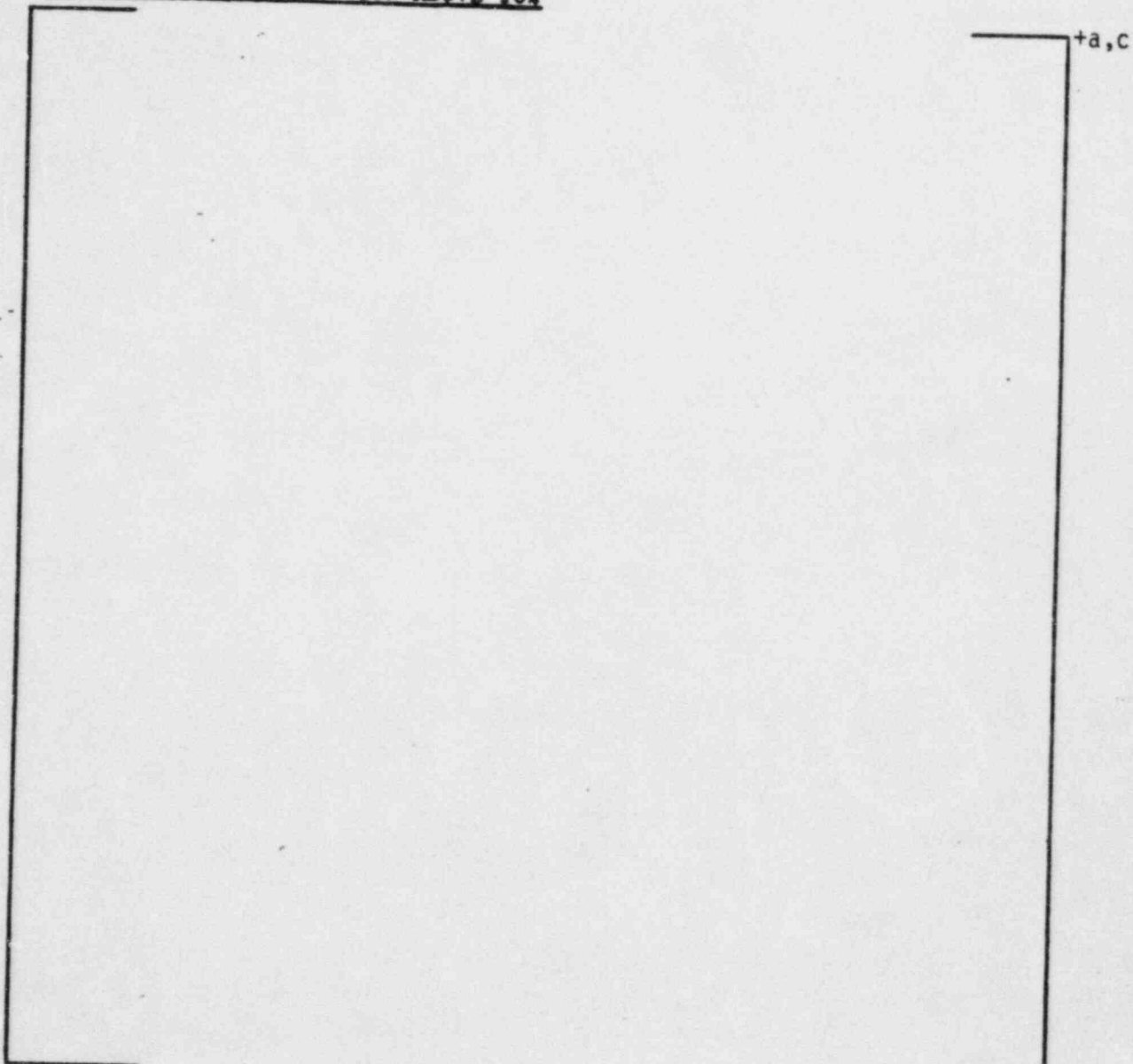
I. PRIOR TO INITIAL CRITICALITY



+a,c

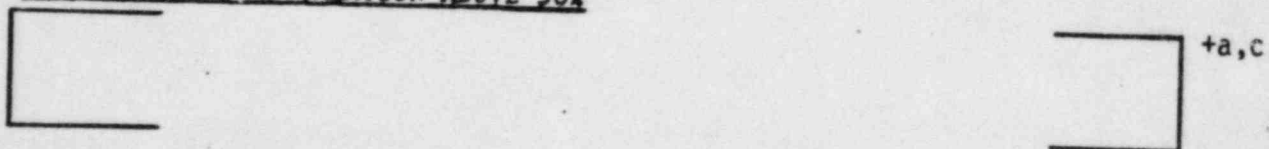
TABLE 3.8 (continued)

II. PRIOR TO POWER ESCALATION ABOVE 10%



+a,c

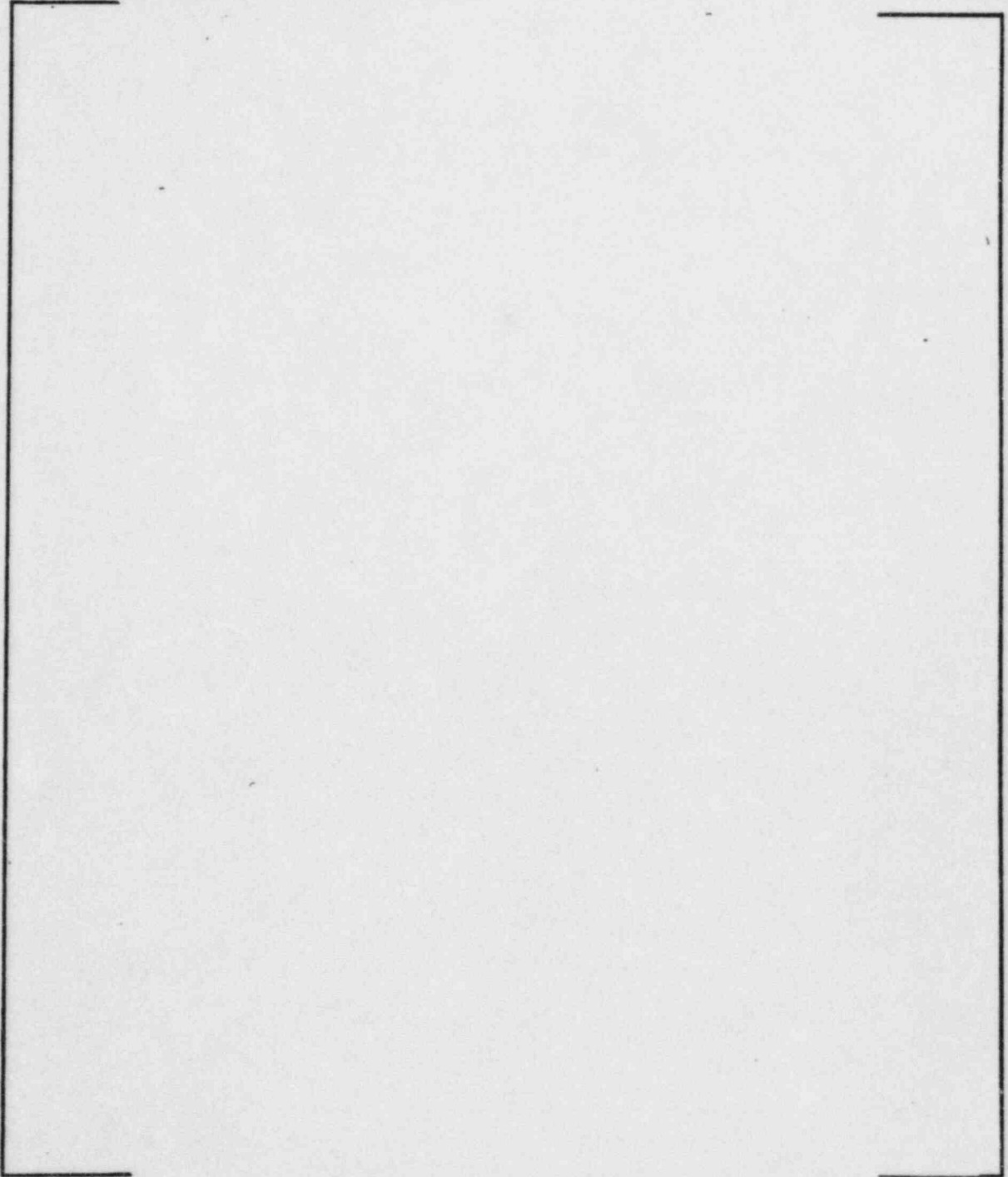
III. PRIOR TO POWER ESCALATION ABOVE 50%



+a,c

TABLE 3.8 (continued)

IV. PRIOR TO POWER ESCALATION ABOVE 75%

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+a,c

TABLE 3.8 (continued)

	+a,c
V. <u>PRIOR TO POWER ESCALATION ABOVE 90%</u>	+a,c