

MAY 14 1974

Docket Nos. 50-254 and 50-265

Commonwealth Edison Company  
ATTN: Mr. J. S. Abel  
Nuclear Licensing Administrator  
Boiling Water Reactors  
Post Office Box 767  
Chicago, Illinois 60690

Gentlemen:

Your letter dated February 8, 1974, proposed changes to the Quad-Cities Technical Specifications relating to the maximum average planar linear heat generation rate (MAPLHGR).

These changes are based on the results of reanalyses relating to fuel densification using the model discussed in General Electric Topical Report NEDO-20181, "GEGAP III A Model for Prediction of Pellet-Clad Thermal Conductance in BWR Fuel Rods" dated November 1973. Modifications to the proposed model were made by the Regulatory staff and transmitted to you by a letter dated December 5, 1973. The changes in the fuel densification model provide for an exposure-dependent gap conductance and time-dependent fuel densification.

The evaluation entitled "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels" dated December 14, 1973, and the enclosed Safety Evaluation by the Directorate of Licensing entitled "Effects of Changing the Pellet-Clad Thermal Conductance" reflect the Regulatory staff's position that the MAPLHGR may be increased in a manner similar to that indicated in your letter of February 8, 1974. On the bases of these evaluations, we find that the proposed changes to the Technical Specifications, dated February 8, 1974, are acceptable.

We have concluded that there is reasonable assurance that operation in the manner accorded by these changes will not endanger the health and safety of the public.

APP.

Docket Nos. 50-254 and 50-265

JIRiesland, L:ORB #2  
Chebron, DRA  
NDube, L:OPS  
MJinks, DRA (8)  
BScharf, DRA (15)  
RMDiggs, L:ORB #2  
SKari, L:RP  
SVarga, L:RP

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TJCarter, L:OR  
ACRS (16)  
RO (3)  
OGC  
JSaltzman, L:OAI  
FLIngram, OIS  
~~HIMueller, CMR/H~~  
JWagner, OC  
WOMiller, DRA  
PCollins, L:OLB  
DLZiemann, L:ORB #2

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We have concluded that ~~the proposed changes to the Quad-Cities Technical Specifications and bases do not involve a significant hazards consideration~~ and ~~that~~ there is reasonable assurance that the health and safety of the public will not be endangered by operation in the manner accorded by these changes.

MAY 14 1974

Accordingly, Amendment Nos. 7 and 4 to Facility Operating Licenses Nos. DPR-29 and DPR-30, respectively, are enclosed revising the Technical Specifications thereto to authorize the requested changes. A copy of a notice which is being forwarded to the Office of the Federal Register for publication relating to this action also is enclosed for your information.

Sincerely,

Original Signed by  
Karl Goller

Karl R. Goller  
Assistant Director for  
Operating Reactors  
Directorate of Licensing

## Enclosures:

1. Safety Evaluation - Effects  
of Changing the Pellet-Clad  
Thermal Conductance
2. Amendment No. 7 to License DPR-29  
Amendment No. 4 to License DPR-30
3. Federal Register Notice

## cc w/enclosures:

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President and Chairman  
Iowa-Illinois Gas and  
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Mr. Robert W. Watts, Chairman  
Rock Island County Board of  
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Rock Island County Courthouse  
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Mr. Leroy Stratton  
Bureau of Radiological Health  
Illinois Department of Public Health  
Springfield, Illinois 62706

OFFICE X75403	L:ORB #2 JIR	L:ORB #2 hRMDiggs	L:ORB #2 DLZiemann	OGG KINSEY 5-10-74	L:OR KRG 5/14/74	pg
SURNAME	JIR	hRMDiggs	DLZiemann	KINSEY	KRG	
DATE	4/29/74	4/29/74	5/12/74	5-10-74	5/14/74	

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING  
SUPPORTING AMENDMENT NOS. 7 & 4 TO LICENSES NOS. DPR-29 AND DPR-30  
(CHANGE NO. 16 TO APPENDIX A OF TECHNICAL SPECIFICATIONS)

COMMONWEALTH EDISON COMPANY

QUAD-CITIES UNITS 1 AND 2

DOCKET NOS. 50-254 AND 50-265

EFFECTS OF CHANGING THE PELLETT-CLAD THERMAL CONDUCTANCE

INTRODUCTION

On August 24, 1973, a change to the Technical Specifications, Appendix A of the Operating Licenses Nos. DPR-29 and DPR-30 for Quad-Cities Units 1 and 2 was issued to account for the effects of fuel densification in boiling water reactor fuel. The background analyses and references pertinent to that change were included in the AEC Regulatory staff report, "Technical Report on Densification of General Electric Reactor Fuels", dated August 23, 1973, and the AEC Regulatory staff report, "Safety Evaluation of the Fuel Densification Effects on the Quad-Cities Station Units 1 and 2", dated August 24, 1973.

Subsequently, General Electric (GE) submitted a report NEDO-20181, "GEGAP III A Model for the Prediction of Pellet-Clad Thermal Conductance in BWR Fuel Rods", November 1973, with related proprietary information provided in NEDC-20181 Supplement I (Proprietary), November 1973. The AEC Regulatory staff has reviewed the GEGAP III model and has issued the report entitled "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels" dated December 14, 1973. On December 5, 1973, letters were sent requesting that licensees provide the necessary analyses and other relevant data needed to determine the consequences of densification and its effect on normal operation, transients, and accidents using an enclosure, "Modified GE Model for Fuel Densification". The licensee provided an analysis of the effect of densification on normal operation, transients, and accidents for the Quad-Cities Station Units 1 and 2 in their letter of December 14, 1973, and referenced the GE letter, "Plant Evaluations with GEGAP III", dated December 12, 1973.

OFFICE ➤						
SURNAME ➤						
DATE ➤						

### EVALUATION

The "Modified GE Model for Fuel Densification" results in an increase in the pellet-clad thermal conductance. This increase results in a decrease in the stored energy of the fuel rods. The pellet-clad thermal conductance value lies between the value used in the FSAR and the value used in the staff evaluation of August 23, 1973. The results of using the gap conductance from the modified version of GEGAP III in the analysis of normal operation and transients is to produce results between those evaluated in the FSAR and those used in the staff evaluation of August 23, 1973. Therefore, it is concluded that the change has essentially no effect on normal operation, and improves the margins to pressure and minimum critical heat flux ratio limits for overpressurization and core flow reduction transients.

The increase in pellet-clad thermal conductance would reduce the consequences of the design basis loss-of-coolant accident assuming a constant linear heat generation rate. The reduction would occur during the heatup phase of the accident as a result of the decreased initial stored energy. However, the stored energy is also dependent on the linear heat generation rate of the fuel. A reduction in stored energy then allows a compensating increase in linear heat generation rate, such that operating flexibility is increased while compliance with the Interim Acceptance Criteria is still maintained. The limit curves for MAPLINGR specified in this change represent the most limiting of three limits: MCHFR, cladding strain, and peak clad temperature following LOCA. The staff concludes that the limitations of the average linear heat generation rate of all rods in any fuel assembly at any axial location to the values given in Figure 3.5.1 combined with the linear heat generation rate limitations given in Specification 3.5.J of the Technical Specifications will assure that the calculated peak clad temperatures will not exceed 2300°F.

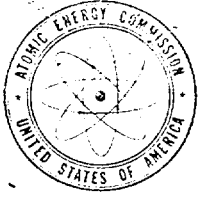
### CONCLUSION

Based on the above, it is concluded that there is a reasonable assurance that the proposed changes to the maximum average planar linear heat generation rates for the Quad-Cities Units 1 and 2 can be made without endangering the health and safety of the public.

151  
John I. Riesland  
Operating Reactors Branch #2  
Directorate of Licensing

Original signed by  
Dennis L. Ziemann

OFFICE >			Dennis L. Ziemann, Chief	
SURNAME >			Operating Reactors Branch #2	
DATE >	MAY 14 1974		Directorate of Licensing	



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

COMMONWEALTH EDISON COMPANY AND  
IOWA-ILLINOIS GAS AND ELECTRIC COMPANY  
DOCKET NO. 50-254  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 7  
License No. DPR-29

1. The Atomic Energy Commission (the Commission) having found that:
  - A. The application for amendment by the Commonwealth Edison Company dated February 8, 1974, 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 issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - C. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, paragraph 3.B of Facility License No. DPR-29 is hereby amended to read as follows:

"B. Technical Specifications

The Technical Specifications contained in Appendices A and B, attached to Facility Operating License No. DPR-29 are revised as indicated in the attachment to this license amendment. The Technical Specifications, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by  
Karl Goller

Karl R. Goller, Assistant Director  
for Operating Reactors  
Directorate of Licensing

Attachment:  
Change No. 16 to Appendix A  
Technical Specifications

Date of Issuance: MAY 14 1974

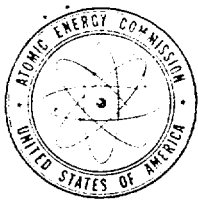
ATTACHMENT TO LICENSE AMENDMENTS NOS. 7 AND 4

CHANGE NO. 16 TO APPENDIX A OF TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NOS. DPR-29 AND 30

Replace the existing unnumbered pages of the Technical Specifications issued with Change No. 8 on 8/24/73 with the enclosed revised pages 105A, 105B, 109B and 109C. The changed areas are reflected by marginal lines.





UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

COMMONWEALTH EDISON COMPANY AND  
IOWA-ILLINOIS GAS AND ELECTRIC COMPANY  
DOCKET NO. 50-265  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 4  
License No. DPR-30

1. The Atomic Energy Commission (the Commission) having found that:
  - A. The application for amendment by the Commonwealth Edison Company dated February 8, 1974, 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 issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - C. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, paragraph 3.B of Facility License No. DPR-30 is hereby amended to read as follows:

"B. Technical Specifications

The Technical Specifications contained in Appendices A and B, attached to Facility Operating License No. DPR-30 are revised as indicated in the attachment to this license amendment. The Technical Specifications, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by

Karl Goller

Karl R. Goller, Assistant Director  
for Operating Reactors  
Directorate of Licensing

Attachment:

Change No. 16 to Appendix A  
Technical Specifications

Date of Issuance: MAY 14 1974

ATTACHMENT TO LICENSE AMENDMENTS NOS. 7 AND 4  
CHANGE NO. 16 TO APPENDIX A OF TECHNICAL SPECIFICATIONS  
FACILITY OPERATING LICENSE NOS. DPR-29 AND 30

Replace the existing unnumbered pages of the Technical Specifications issued with Change No. 8 on 8/24/73 with the enclosed revised pages 105A, 105B, 109B and 109C. The changed areas are reflected by marginal lines.

### 3.5 LIMITING CONDITIONS FOR OPERATION

#### J. Average Planar LHGR

During steady state power operation, the average linear heat generation rate (LHGR) of all the rods in any fuel assembly, as a function of average planar exposure, at any axial location, shall not exceed the maximum average planar shown in Figure 3.5.1.

#### K. Local LHGR

During steady state power operation, the linear heat generation rate (LHGR) of any rod in any fuel assembly at any axial location shall not exceed the maximum allowable LHGR as calculated by the following equation:

$$\text{LHGR}_{\text{max}} \leq \text{LHGR}_d \left[ 1 - \left( \frac{\Delta P}{P} \right)_{\text{max}} \left( \frac{L}{L_T} \right) \right]$$

$$\text{LHGR}_d = \text{Design LHGR} = 17.5 \text{ KW/ft}$$

$$\left( \frac{\Delta P}{P} \right)_{\text{max}} = \text{Maximum power spiking penalty} = 0.035$$

$$L_T = \text{Total core length} = 12 \text{ ft}$$

$$L = \text{Axial position above bottom of core}$$

### 4.5 SURVEILLANCE REQUIREMENTS

#### J. Average Planar LHGR

Daily during reactor power operation, the average planar LHGR shall be checked.

#### K. Local LHGR

Daily during reactor power operation, the local LHGR shall be checked.

QUAD-CITIES 1-2 INITIAL CORE

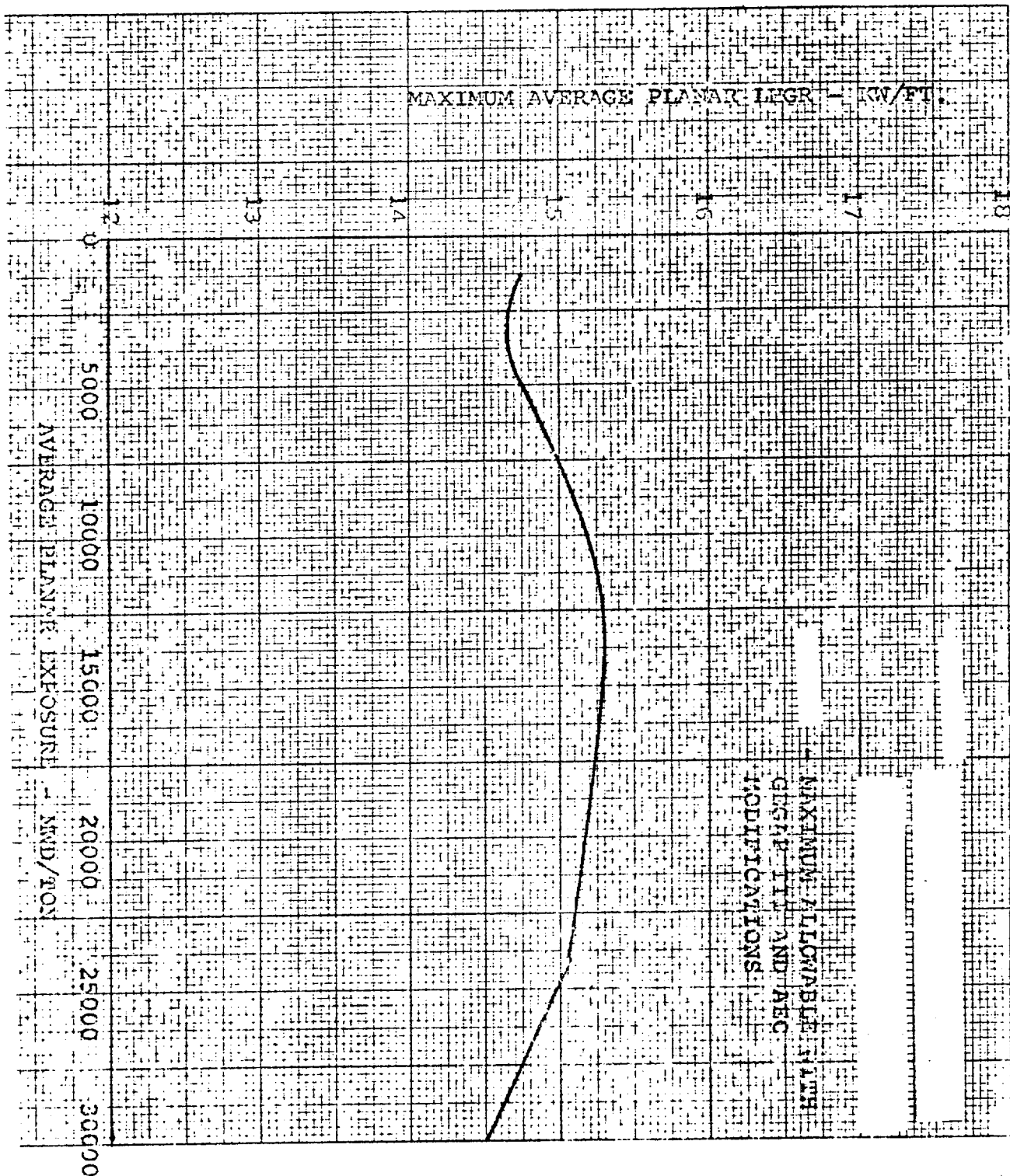


FIGURE 3.5.1 MAXIMUM ALLOWABLE AVERAGE PLANAR LFGR APPLICABLE  
TO FUEL TYPE INITIAL CORE, TYPE I, II, III.

### 3.5.J Average Planar LHGR

This specification assures that the peak cladding temperature following the postulated design basis loss-of-coolant accident will not exceed the 2300°F limit specified in the Interim Acceptance Criteria (IAC) issued in June 1971 considering the postulated effects of fuel pellet densification.

The peak cladding temperature following a postulated loss-of-coolant accident is primarily a function of the average heat generation rate of all the rods of a fuel assembly at any axial location and is only dependent secondarily on the rod to rod power distribution within an assembly. Since expected local variations in power distribution within a fuel assembly affect the calculated peak clad temperature by less than  $\pm 20^{\circ}\text{F}$  relative to the peak temperature for a typical fuel design, the limit on the average linear heat generation rate is sufficient to assure that calculated temperatures are below the IAC limit.

The maximum average planar LHGR's shown in Figure 3.5.1 are based on calculations employing the models described in the General Electric Report NEDM-10735 as modified by General Electric Report NEDO-20181, which was modified by the Regulatory staff in "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels, December 14, 1973".

### 3.5.K Local LHGR

This specification assures that the linear heat generation rate in any rod is less than the design linear heat generation even if fuel pellet densification is postulated. The power spike penalty specified is based on the analysis presented in Section 3.2.1 of the GE Topical Report NEDM-10735 Supplement 6, and assumes a linearly increasing variation

in axial gaps between core bottom and top, and assures with a 95% confidence, that no more than one fuel rod exceeds the design linear heat generation rate due to power spiking. An irradiated growth factor of 0.25% was used as the basis for determining  $\Delta P/P$  in accordance with General Electric Development and Planning Memorandum #45, "Length Growth of BWR Fuel Elements," R. A. Proebsthe, October 1, 1973 and U.S. Atomic Energy Commission report, "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels," December 14, 1973.

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NOS. 50-254 AND 50-265

COMMONWEALTH EDISON COMPANY AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY  
(Quad-Cities Units 1 and 2)

NOTICE OF ISSUANCE OF CHANGES TO  
TECHNICAL SPECIFICATIONS OF FACILITY OPERATING LICENSES

No request for a hearing or petition for leave to intervene having been filed following publication of the notice of proposed action in the Federal Register on March 22, 1974 (39 F.R. 10928), the Atomic Energy Commission (the Commission) has issued Change No. 16 to the Technical Specifications of Facility Operating Licenses Nos. DPR-29 and DPR-30 to the Commonwealth Edison Company and the Iowa-Illinois Gas and Electric Company (the licensees). This change, effective immediately, authorized only that portion of the proposed action dealing with changes to the limiting conditions for operation associated with fuel densification for the current 7 x 7 fuel authorized for use in Quad-Cities Units 1 and 2. The licensees are presently authorized to possess and operate Quad-Cities Units 1 and 2 located in Rock Island County, Illinois, at power levels up to 2511 MWt using a full core of 7 x 7 fuel (containing uranium 235).

The Commission's Regulatory staff has found that the application for the above action dated February 8, 1974, complies with the requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission regulations published in 10 CFR Chapter I and has completed its evaluation



of the action and issued a Safety Evaluation concluding that there is reasonable assurance that the health and safety of the public will not be endangered by operation in accordance with the changes to the Technical Specifications as authorized by Change No. 16, which is incorporated in the subject licenses by Amendments 7 and 4 thereto.

A copy of Amendments 7 and 4 with Change No. 16 to the Technical Specifications of Facility Operating Licenses Nos. DPR-29 and DPR-30 and the Directorate of Licensing's Safety Evaluation are available for public inspection at the Commission's Public Document Room at 1717 H Street, N. W., Washington, D. C., and at the Moline Public Library at 504 - 17th Street in Moline, Illinois 61265. Single copies of these items may be obtained upon request sent to the U. S. Atomic Energy Commission, Washington, D. C., 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by  
Dennis L. Ziemann

Dennis L. Ziemann, Chief  
Operating Reactors Branch #2  
Directorate of Licensing

Dated at Bethesda, Maryland,  
this      day of MAY 14 1974