

DISTRIBUTION:  
 AEC PDR CHEbron  
 Local PDR (amed only)  
 Dockets (2) RSchemel  
 ORB#3 Rdg ACRS (16)  
 OGC extra cps  
 RO (3) HJMcAlduff  
 NDube JRBuchanan  
 BJones (w/4 encls)  
 RVollmer TBAbernathy  
 JSaltzman (w/o TS)  
 SATEets  
 DMelliott  
 SKari (w/o TS)  
 WOMiller  
 BScharf (15)  
 TJCarter  
 PCollins  
 SVarga

NOV 22 1974

Dockets Nos. 50-277  
 and 50-278

Philadelphia Electric Company  
 ATTN: Mr. Edward G. Bauer, Esquire  
 Vice President and General  
 Counsel  
 2301 Market Street  
 Philadelphia, Pennsylvania 19101

Gentlemen:

The Commission has issued the enclosed Amendments Nos. 5 and 3 to Facility Operating Licenses Nos. DPR-44 and DPR-56 respectively, for the Peach Bottom Atomic Power Station, Units No. 2 and 3. These amendments include Changes Nos. 6 and 3 respectively and are in response to your request of July 12, 1974.

These amendments revise the provisions in the Technical Specifications relating to fuel densification. Operation of the facilities will be within the limits and restrictions of both the change to the Technical Specifications and the Emergency Core Cooling System evaluation.

A copy of the Federal Register Notice is also enclosed.

Sincerely,

Original Signed

George Lear, Chief  
 Operating Reactors Branch #3  
 Directorate of Licensing

Enclosures:

1. Amendments Nos. 6 and 3
2. Federal Register Notice

cc: See next page

OFFICE	ORB#3	ORB#3	ORB#3	L:AD/ORS	
SURNAME	DMelliott:kmi	SATEets	GLear GK	KRGollefer	Conrad H
DATE	11/7/74	11/8/74	11/8/74	11/22/74	11/27/74

NOV 22 1974

cc: w/enclosures

Eugene J. Bradley, Esquire  
Philadelphia Electric Company  
Assistant General Counsel  
2301 Market Street  
Philadelphia, Pennsylvania 19101

Albert R. Steele, Chairman  
Board of Supervisors  
Peach Bottom Township  
R. D. No. 1  
Delta, Pennsylvania 17314

Wilmer P. Bolton  
Chairman, Board of Supervisors  
Drumore Township  
R. D. No. 1  
Holtwood, Pennsylvania 17532

Mrs. Louisa R. Yeagley  
Martin Memorial Library  
159 E. Market Street  
York, Pennsylvania 17401

Mr. R. A. Heiss, Coordinator  
Pennsylvania State Clearinghouse  
Governor's Office of State Planning  
and Development  
P. O. Box 1323  
Harrisburg, Pennsylvania 17120  
(w/o enclosures)

Mr. Thomas M. Gerusky, Director  
Office of Radiological Health  
Department of Environmental  
Resources  
P. O. Box 2063  
Harrisburg, Pennsylvania 17105

Troy B. Conner, Jr., Esquire  
Conner, Hadlock & Knotts  
1747 Pennsylvania Avenue, NW  
Washington, D. C. 20006

Raymond L. Hovis, Esquire  
35 South Duke Street  
York, Pennsylvania 17401

W. W. Anderson, Esquire  
Deputy Attorney General  
Department of Justice  
Second Floor - Capitol Annex  
Harrisburg, Pennsylvania 17120

John B. Griffith, Esquire  
Special Assistant Attorney  
General, Maryland  
Annapolis, Maryland

Warren Rich, Esquire  
Special Assistant Attorney  
General, Maryland  
Annapolis, Maryland 21401

Mr. Robert Blanco  
Environmental Protection Agency  
Region III  
Curtis Building  
6th and Walnut Street  
Philadelphia, Pennsylvania 19106



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

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. 50-277

PEACH BOTTOM ATOMIC POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5  
License No. DPR-44

1. The Atomic Energy Commission (the Commission) has found that:
  - A. The application for amendment by Philadelphia Electric Company (the licensee) dated July 12, 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 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. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility License No. DPR-44 is hereby amended to read as follows:

"(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 6."

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

FOR THE ATOMIC ENERGY COMMISSION

Original Signed

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

Attachment:  
Change No. 6 to the  
Technical Specifications

Date of Issuance: NOV 22 1974

ATTACHMENT TO LICENSE AMENDMENT NO. 5

(CHANGE NO. 6 TO THE TECHNICAL SPECIFICATIONS)

FACILITY OPERATING LICENSE NO. DPR-44

DOCKET NO. 50-277

Replace pages 133a, 134, 140, 140a and 142 with the attached revised pages. Add the attached new page 133b. (No changes were made on page 134.)

LIMITING CONDITION FOR OPERATION

SURVEILLANCE REQUIREMENT

3.5.I 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 LHGR shown in Figure 3.5.1.A or Figure 3.5.1.B.\*

3.5.J 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:

$$LHGR_{max} \leq LHGR_d \left[ 1 + \left( \frac{\Delta P}{P} \right)_{max} \left( \frac{L}{L_T} \right) \right]$$

$LHGR_d = \text{Design LHGR} = 18.5 \text{ kw/ft.}$

$\frac{\Delta P}{P_{max}} = \text{Maximum power spiking penalty}$   
 $= 0.037 \text{ unit 2}$   
 $= 0.032 \text{ unit 3}$

$L_T = \text{Total core length} = 12 \text{ ft.}$   
 $= 12 \text{ feet Unit 2}$   
 $= 12.167 \text{ feet Unit 3}$

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

\*On August 5, 1974, Philadelphia Electric Company submitted an Emergency Core Cooling System (ECCS) evaluation and proposed changes to the Technical Specifications in accordance with 10 CFR Part 50, Section 50.46. Upon submittal of the ECCS evaluation and proposed Technical Specifications, 10 CFR Part 50, Section 50.46(a)(2)(iv) required that the facility shall be operated within the (more conservative) limits of both the proposed and approved Technical Specifications. In order to satisfy 10 CFR Part 50, Section 50.46, facility operation shall therefore be within all the limits and restrictions

4.5.I Average Planar LHGR

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

4.5.J Local LHGR

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

LIMITING CONDITION FOR OPERATION

SURVEILLANCE REQUIREMENT

\*of both this Technical Specification change and the ECCS evaluation, including the proposed Technical Specifications, submitted on August 5, 1974, unless modified by the Director of Regulation pursuant to 10 CFR Part 50, Section 50.46 (a)(2)(v).

### 3.5.A BASES

#### Core Spray and LPCI Subsystems

This specification assures that adequate emergency cooling capability is available whenever irradiated fuel is in the reactor vessel.

Based on the loss-of-coolant analysis included in General Electric Topical Report NEDO-10329 and the sensitivity studies given in Supplement 1 thereto and subsection 6.7 of the FSAR and the Philadelphia Electric Company letter dated August 26, 1971, and in accordance with the AEC's "Interim Acceptance Criteria for Emergency Core Cooling Systems" published on June 19, 1971, any of the following cooling systems provides sufficient cooling to the core to dissipate the energy associated with the loss-of-coolant accident, to limit calculated fuel clad temperature to less than 2300°F to assure that core geometry remains intact, and to limit clad metal-water reaction to less than 1t; the two core spray subsystems; or either of the two core spray subsystems and two RHR pumps operating in the LPCI mode with operable LPCI injection valves.

The limiting conditions of operation in Specifications 3.5.A.1 through 3.5.A.6 specify the combinations of operable subsystems to assure the availability of the minimum cooling systems noted above.

Core spray distribution has been shown, in full-scale tests of systems similar in design to that of Peach Bottom 2 and 3, to exceed the minimum requirements by at least 25%. In addition, cooling effectiveness has been demonstrated at less than half the rated flow in simulated fuel assemblies with heater rods to duplicate the decay heat characteristics of irradiated fuel. The accident analysis is additionally conservative in that no credit is taken for spray coolant entering the reactor before the internal pressure has fallen to 105 psig.

The LPCI subsystem is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system functions in combination with the core spray system to prevent excessive fuel clad temperature. The LPCI subsystem and the core spray subsystem provide adequate cooling for break areas of approximately 0.2 square feet up to and including the double-ended recirculation line break without assistance from the high pressure emergency core cooling subsystems.



## 3.5 BASES (cont'd.)

H. Engineered Safeguards Compartments Cooling and Ventilation

One unit cooler in each pump compartment is capable of providing adequate ventilation flow and cooling. Engineering analyses indicate that the temperature rise in safeguards compartments without adequate ventilation flow or cooling is such that continued operation of the safeguards equipment or associated auxiliary equipment cannot be assured. Ventilation associated with the High Pressure Service Water Pumps is also associated with the Emergency Service Water pumps, and is specified in Specification 3.9.

I. 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 + 20 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 linear heat generation rates shown in Figures 3.5.1.A and 3.5.1.B are based on calculations employing the GEGAP III model described in the General Electric reports 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 (Proprietary), November 1973.

GEGAP III is a theoretical model which provides an exposure dependent pellet-clad gap thermal conductance by incorporating time-dependent fuel densification, time-dependent gap closure, and gap closure effects due to cladding creepdown. Validity of GEGAP III has been verified by comparison with in-reactor experimental results. The accuracy of the evaluation of fuel performance, post LOCA, was improved with the use of GEGAP III, since previous gap conductance models did not have the capability for calculating the fuel cladding gap conductance as a function of fuel lifetime.

Use of the GEGAP III model yields an increase in the calculated pellet-clad gap conductance which in turn causes a decrease in the calculated stored energy in the fuel rods. A reduction in calculated stored energy reduces the calculated peak clad temperature following a postulated LOCA or, conversely, allows a compensating increase in MAPLHGR for a constant calculated peak clad temperature. The specified MAPLHGR values maintain a calculated peak clad temperature within the limitation imposed by the IAC.

PBAPS

J. 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.

Figure 3.5.1.A

PBAPS INITIAL CORE TYPE 2

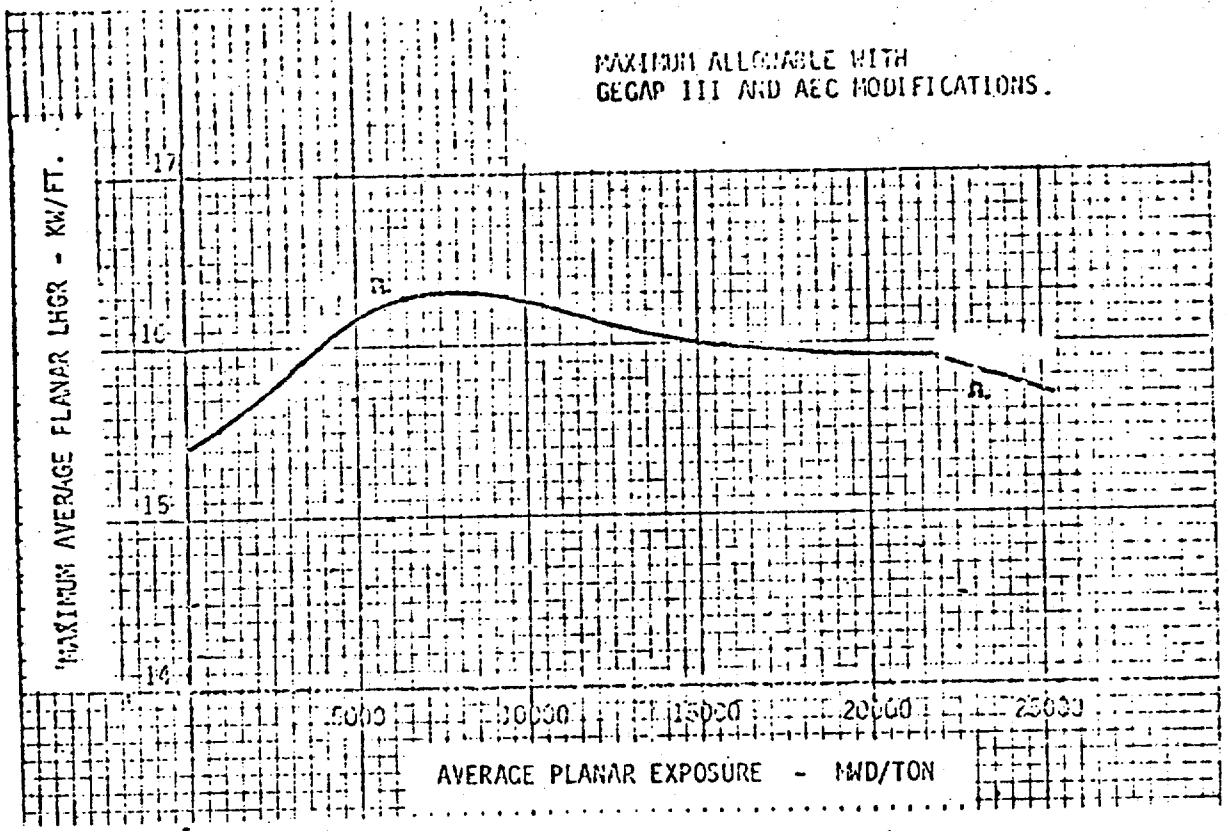
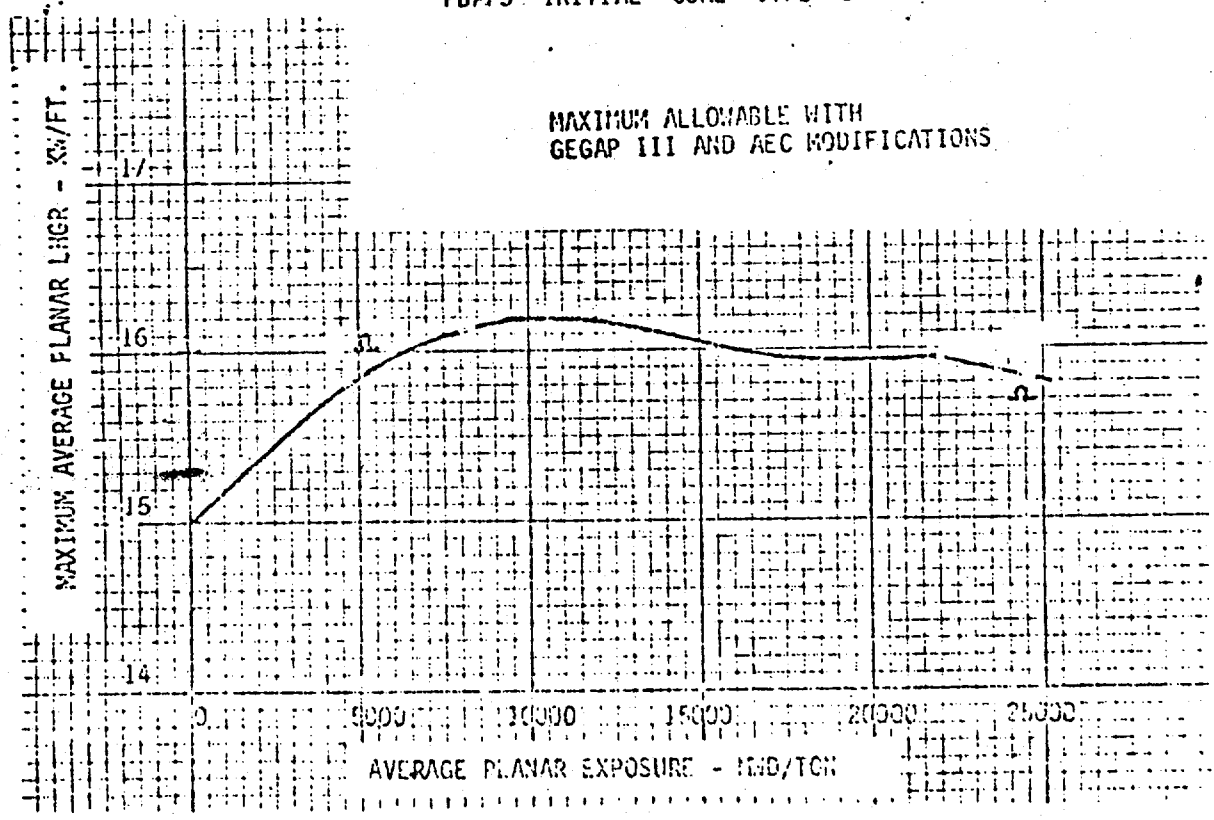


FIGURE 3.5.1.B

PBAPS INITIAL CORE TYPE 3&1





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

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. 50-273

PEACH BOTTOM ATOMIC POWER STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 3  
License No. DPR-56

1. The Atomic Energy Commission (the Commission) has found that:
  - A. The application for amendment by Philadelphia Electric Company (the licensee) dated July 12, 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 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. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility License No. DPR-56 is hereby amended to read as follows:

"(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 3."

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

FOR THE ATOMIC ENERGY COMMISSION

Original Signed

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

Attachment:  
Change No. 3 to the  
Technical Specifications

Date of Issuance: NOV 22 1974

ATTACHMENT TO LICENSE AMENDMENT NO. 3

(CHANGE NO. 3 TO THE TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NO. DPR-56

DOCKET NO. 50-278

Replace pages 133a, 134, 140, 140a and 142 with the attached revised pages. Add the attached new page 133b. (No changes were made on page 134.)

LIMITING CONDITION FOR OPERATION

SURVEILLANCE REQUIREMENT

3.5.I 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 LHGR shown in Figure 3.5.1.A or Figure 3.5.1.B.\*

4.5.I Average Planar LHGR

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

4.5.J Local LHGR

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

3.5.J 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:

$$LHGR_{max} \leq LHGR_d \left[ 1 + \left( \frac{\Delta P}{P} \right)_{max} \left( \frac{L}{L_T} \right) \right]$$

$LHGR_d$  = Design LHGR = 18.5 kw/ft.

$\frac{\Delta P}{P_{max}}$  = Maximum power spiking penalty

= 0.037 unit 2

= 0.032 unit 3

$L_T$  = Total core length = 12 ft.

= 12 feet Unit 2

= 12.167 feet Unit 3

$L$  = Axial position above bottom of core

\*On August 5, 1974, Philadelphia Electric Company submitted an Emergency Core Cooling System (ECCS) evaluation and proposed changes to the Technical Specifications in accordance with 10 CFR Part 50, Section 50.46. Upon submittal of the ECCS evaluation and proposed Technical Specifications, 10 CFR Part 50, Section 50.46(a)(2)(iv) required that the facility shall be operated within the (more conservative) limits of both the proposed and approved Technical Specifications. In order to satisfy 10 CFR Part 50, Section 50.46, facility operation shall therefore be within all the limits and restrictions

LIMITING CONDITION FOR OPERATION

SURVEILLANCE REQUIREMENT

\*of both this Technical Specification  
change and the ECCS evaluation, including  
the proposed Technical Specifications,  
submitted on August 5, 1974, unless  
3 modified by the Director of Regulation  
pursuant to 10 CFR Part 50, Section 50.46  
(a)(2)(v).



**3.5.A BASES****Core Spray and LPCI Subsystems**

This specification assures that adequate emergency cooling capability is available whenever irradiated fuel is in the reactor vessel.

Based on the loss-of-coolant analysis included in General Electric Topical Report NEDO-10329 and the sensitivity studies given in Supplement 1 thereto and subsection 6.7 of the FSAR and the Philadelphia Electric Company letter dated August 26, 1971, and in accordance with the AEC's "Interim Acceptance Criteria for Emergency Core Cooling Systems" published on June 19, 1971, any of the following cooling systems provides sufficient cooling to the core to dissipate the energy associated with the loss-of-coolant accident, to limit calculated fuel clad temperature to less than 2300°F to assure that core geometry remains intact, and to limit clad metal-water reaction to less than 1%; the two core spray subsystems; or either of the two core spray subsystems and two RHR pumps operating in the LPCI mode with operable LPCI injection valves.

The limiting conditions of operation in Specifications 3.5.A.1 through 3.5.A.6 specify the combinations of operable subsystems to assure the availability of the minimum cooling systems noted above.

Core spray distribution has been shown, in full-scale tests of systems similar in design to that of Peach Bottom 2 and 3, to exceed the minimum requirements by at least 25%. In addition, cooling effectiveness has been demonstrated at less than half the rated flow in simulated fuel assemblies with heater rods to duplicate the decay heat characteristics of irradiated fuel. The accident analysis is additionally conservative in that no credit is taken for spray coolant entering the reactor before the internal pressure has fallen to 105 psig.

The LPCI subsystem is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system functions in combination with the core spray system to prevent excessive fuel clad temperature. The LPCI subsystem and the core spray system provide adequate cooling for break areas of approximately 0.2 square feet up to and including the double-ended recirculation line break without assistance from the high pressure emergency core cooling subsystems.

## 3.5 BASES (cont'd.)

H. Engineered Safeguards Compartments Cooling and Ventilation

One unit cooler in each pump compartment is capable of providing adequate ventilation flow and cooling. Engineering analyses indicate that the temperature rise in safeguards compartments without adequate ventilation flow or cooling is such that continued operation of the safeguards equipment or associated auxiliary equipment cannot be assured. Ventilation associated with the High Pressure Service Water Pumps is also associated with the Emergency Service Water pumps, and is specified in Specification 3.9.

I. 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 + 20 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 linear heat generation rates shown in Figures 3.5.1.A and 3.5.1.B are based on calculations employing the GEGAP III model described in the General Electric reports 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 (Proprietary), November 1973.

GEGAP III is a theoretical model which provides an exposure dependent pellet-clad gap thermal conductance by incorporating time-dependent fuel densification, time-dependent gap closure, and gap closure effects due to cladding creepdown. Validity of GEGAP III has been verified by comparison with in-reactor experimental results. The accuracy of the evaluation of fuel performance, post LOCA, was improved with the use of GEGAP III, since previous gap conductance models did not have the capability for calculating the fuel cladding gap conductance as a function of fuel lifetime.

Use of the GEGAP III model yields an increase in the calculated pellet-clad gap conductance which in turn causes a decrease in the calculated stored energy in the fuel rods. A reduction in calculated stored energy reduces the calculated peak clad temperature following a postulated LOCA or, conversely, allows a compensating increase in MAPLHGR for a constant calculated peak clad temperature. The specified MAPLHGR values maintain a calculated peak clad temperature within the limitation imposed by the IAC.

PBAPS

J. 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.

PBAPS INITIAL CORE TYPE 2

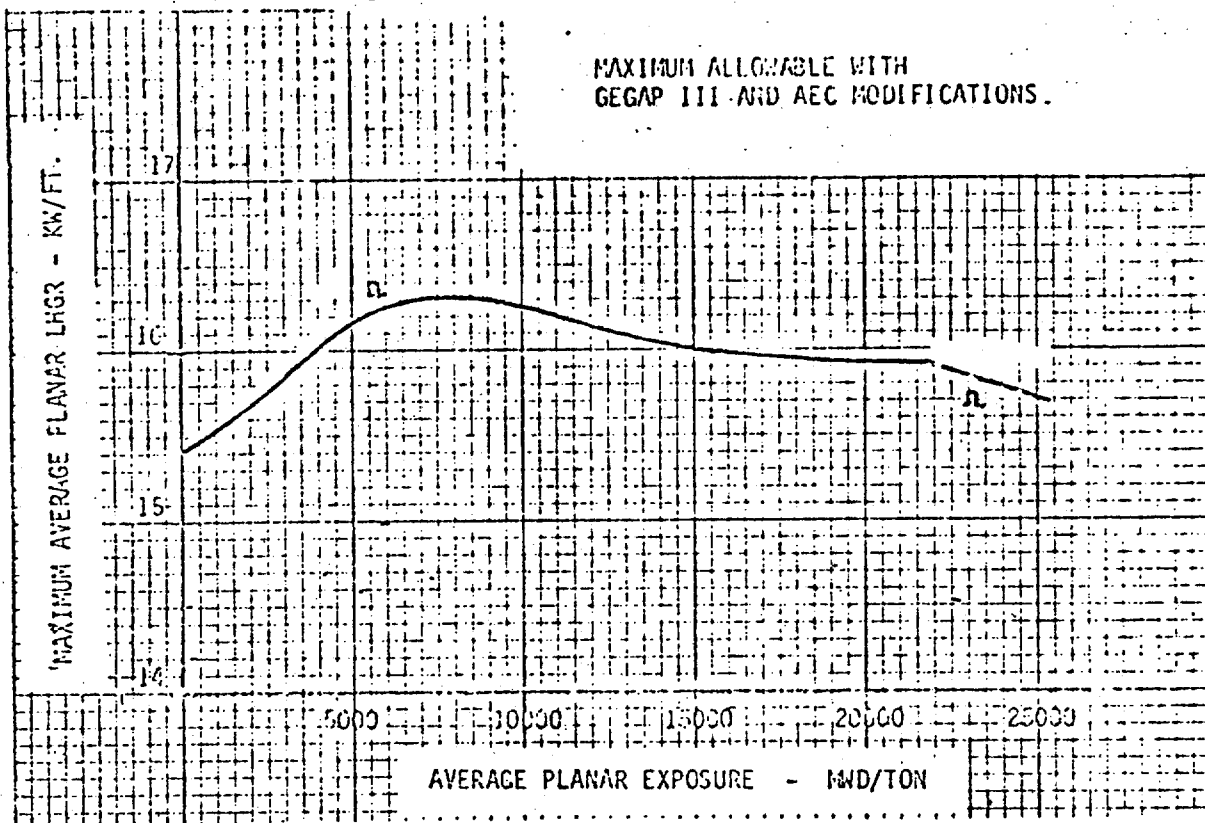
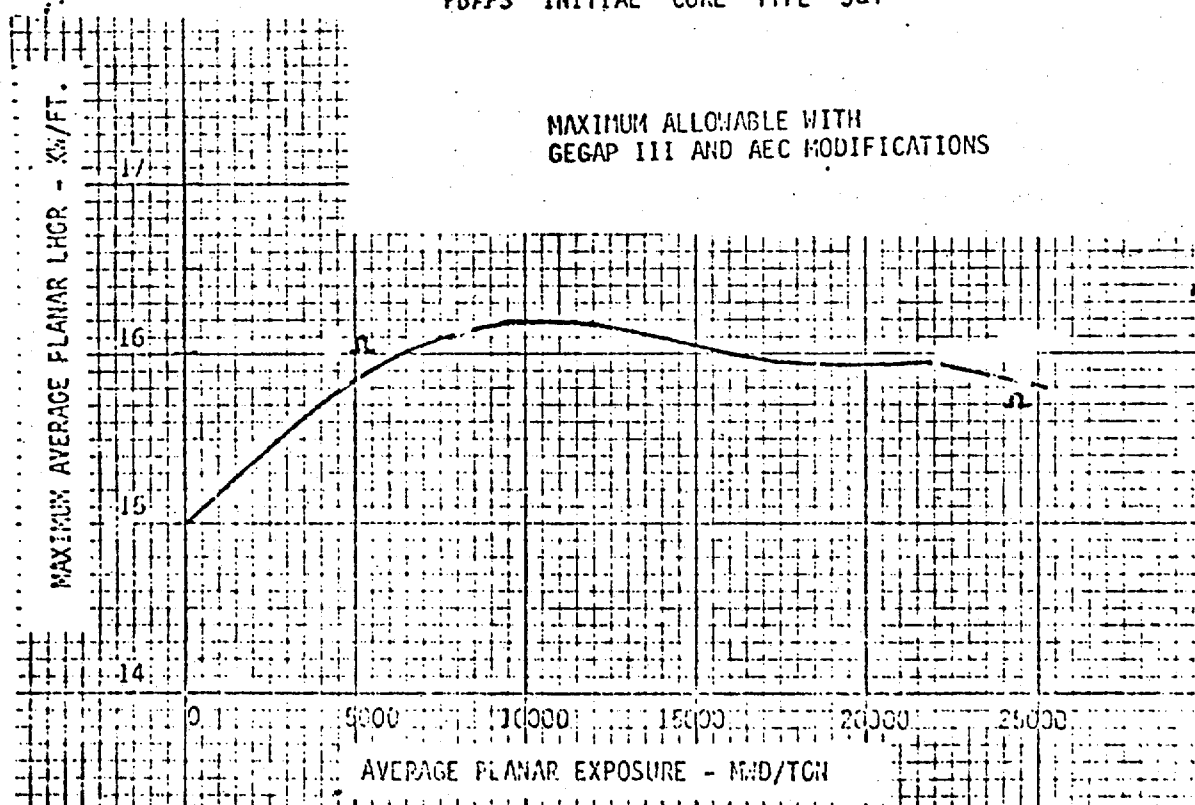


FIGURE 3.5.1.B

PBAPS INITIAL CORE TYPE 3&1



U. S. ATOMIC ENERGY COMMISSION

DOCKETS NOS. 50-277 AND 50-278

PHILADELPHIA ELECTRIC COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS  
TO 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 October 18, 1974 (39 F.R. 37236), the Atomic Energy Commission (the Commission) has issued Amendments Nos. 5 and 3 to Facility Operating Licenses Nos. DPR-44 and DPR-56 respectively. The licenses authorize the Philadelphia Electric Company to operate the Peach Bottom Nuclear Power Station, Units Nos. 2 and 3, located in Peach Bottom, York County, Pennsylvania. These amendments are effective as of date of issuance.

The amendments revise the provisions in the Technical Specifications relating to fuel densification. Operation of the facilities will be within the limits and restrictions of both the change to the Technical Specifications and the Emergency Core Cooling System evaluation, including proposed Technical Specifications submitted by the licensee on August 5, 1974.

The Commission has found that the application for amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments.

OFFICE >						
SURNAME >						
DATE >						

For further details with respect to these license amendments see Amendments Nos. 5 and 3 with Changes Nos. 6 and 3 which are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Martin Memorial Library, 159 E. Market Street, York, Pennsylvania. A single copy of the items may be obtained upon request addressed to the U. S. Atomic Energy Commission, Washington, D. C. 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

Dated at Bethesda, Maryland, this            day of

FOR THE ATOMIC ENERGY COMMISSION

Original Signed

George Lear, Chief  
Operating Reactors Branch #3  
Directorate of Licensing

OFFICE >						
SURNAME >						
DATE >						