



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

March 28, 2001

Mr. Gregg R. Overbeck  
Senior Vice President, Nuclear  
Arizona Public Service Company  
P. O. Box 52034  
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 -  
ISSUANCE OF AMENDMENTS TO CHANGING THE MINIMUM DEPARTURE  
OF THE NUCLEATE BOILING RATIO (TAC NOS. MB0745, MB0746, AND  
MB0747)

Dear Mr. Overbeck:

The Commission has issued the enclosed Amendment No. 133 to Facility Operating License No. NPF-41, Amendment No. 133 to Facility Operating License No. NPF-51, and Amendment No. 133 to Facility Operating License No. NPF-74 for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 1, 2000 (102-04506).

The amendments change the minimum departure from nucleate boiling ratio (DNBR) to " $\geq 1.3$  (through operating cycle 10)" and " $\geq 1.34$  (operating cycle 11 and later)" in TS 2.1.1.1 and in function 15, DNBR - Low, in TS Table 3.3.1-1, "Reactor Protective System Instrumentation." The amendments are structured such that the " $\geq 1.34$ " would become effective for each unit in operating cycle 11 and later. Operating cycle 11 begins in spring 2002 for Unit 2, in fall 2002 for Unit 1, and in spring 2003 for Unit 3. Until operating cycle 11, the " $\geq 1.30$ " remains the minimum DNBR requirement for the three units. The amendments shall be implemented within 60 days of the date of issuance.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

Jack N. Donohew, Senior Project Manager, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,  
and STN 50-530

Enclosures: 1. Amendment No. 133 to NPF-41  
2. Amendment No. 133 to NPF-51  
3. Amendment No. 133 to NPF-74  
4. Safety Evaluation

cc w/encls: See next page

Palo Verde Generating Station, Units 1, 2, and 3

cc:

Mr. Steve Olea  
Arizona Corporation Commission  
1200 W. Washington Street  
Phoenix, AZ 85007

Douglas Kent Porter  
Senior Counsel  
Southern California Edison Company  
Law Department, Generation Resources  
P.O. Box 800  
Rosemead, CA 91770

Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
P. O. Box 40  
Buckeye, AZ 85326

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
Harris Tower & Pavillion  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-8064

Chairman  
Maricopa County Board of Supervisors  
301 W. Jefferson, 10th Floor  
Phoenix, AZ 85003

Mr. Aubrey V. Godwin, Director  
Arizona Radiation Regulatory Agency  
4814 South 40 Street  
Phoenix, AZ 85040

Mr. Craig K. Seaman, Director  
Regulatory Affairs  
Arizona Public Service Company  
P.O. Box 52034  
Phoenix, AZ 85072-2034

Mr. John C. Horne  
Vice President, Power Generation  
El Paso Electric Company  
2702 N. Third Street, Suite 3040  
Phoenix, AZ 85004

Mr. David Summers  
Public Service Company of New Mexico  
414 Silver SW, #1206  
Albuquerque, NM 87102

Mr. Jarlath Curran  
Southern California Edison Company  
5000 Pacific Coast Hwy Bldg DIN  
San Clemente, CA 92672

Mr. Robert Henry  
Salt River Project  
6504 East Thomas Road  
Scottsdale, AZ 85251

Terry Bassham, Esq.  
General Counsel  
El Paso Electric Company  
123 W. Mills  
El Paso, TX 79901

Mr. John Schumann  
Los Angeles Department of Water & Power  
Southern California Public Power Authority  
P.O. Box 51111, Room 1255-C  
Los Angeles, CA 90051-0100



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-528

PALO VERDE NUCLEAR GENERATING STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 133  
License No. NPF-41

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated December 1, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-41 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 133, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Stephen Dembek, Chief, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 28, 2001



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-529

PALO VERDE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 133  
License No. NPF-51

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated December 1, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-51 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 133 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Stephen Dembek, Chief, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 28, 2001



UNITED STATES  
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WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-530

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 133  
License No. NPF-74

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated December 1, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-74 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 133 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Stephen Dembek, Chief, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 28, 2001



ATTACHMENT TO LICENSE AMENDMENT NOS. 133, 133, AND 133

FACILITY OPERATING LICENSE NOS. NPF-41, NPF-51, AND NPF-74

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

2.0-1  
2.0-2  
3.3.1-10

INSERT

2.0-1  
2.0-2  
3.3.1-10

## 2.0 SAFETY LIMITS (SLs)

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### 2.1 SLs

#### 2.1.1 Reactor Core SLs

2.1.1.1 In MODES 1 and 2, Departure from Nucleate Boiling Ratio (DNBR) shall be maintained as follows:

$\geq 1.3$  (through operating cycle 10)

$\geq 1.34$  (operating cycle 11 and later)

2.1.1.2 In MODES 1 and 2, the peak Linear Heat Rate (LHR) (adjusted for fuel rod dynamics) shall be maintained at  $\leq 21.0$  kW/ft.

#### 2.1.2 Reactor Coolant System (RCS) Pressure SL

In MODES 1, 2, 3, 4, and 5, the RCS pressure shall be maintained at  $\leq 2750$  psia.

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### 2.2 SL Violations

2.2.1 If SL 2.1.1.1 or SL 2.1.1.2 is violated, restore compliance and be in MODE 3 within 1 hour.

2.2.2 If SL 2.1.2 is violated:

2.2.2.1 In MODE 1 or 2, restore compliance and be in MODE 3 within 1 hour.

2.2.2.2 In MODE 3, 4, or 5, restore compliance within 5 minutes.

2.2.3 Within 1 hour, notify the NRC Operations Center, in accordance with 10 CFR 50.72.

2.2.4 Within 24 hours, notify the Director, Operations and Vice President, Nuclear Production.

(continued)

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2.0 SLs

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2.2.5 Within 30 days of the violation, a Licensee Event Report (LER) shall be prepared pursuant to 10 CFR 50.73. The LER shall be submitted to the NRC and the Director, Operations and Vice President, Nuclear Production.

2.2.6 Operation of the unit shall not be resumed until authorized by the NRC.

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RPS Instrumentation - Operating  
3.3.1

Table 3.3.1-1 (page 3 of 3)  
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
14. Local Power Density - High(b)	1.2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	≤ 21.0 kW/ft
15. Departure From Nucleate Boiling Ratio (DNBR) - Low(b)	1.2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13	≥ 1.3 (through operating cycle 10)  ≥ 1.34 (operating cycle 11 and later)

(b) Trip may be bypassed when logarithmic power is < 1E-4% NRTP. Bypass shall be automatically removed when logarithmic power is ≥ 1E-4% NRTP.



UNITED STATES  
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. NPF-41,  
AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. NPF-51,  
AND AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. NPF-74  
ARIZONA PUBLIC SERVICE COMPANY, ET AL.  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3  
DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

1.0 INTRODUCTION

By application dated December 1, 2000, the Arizona Public Service Company (the licensee) requested changes to the Technical Specifications (TSs) for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (Palo Verde). The licensee submitted this request on behalf of itself, the Salt River Project Agricultural Improvement and Power District, Southern California Edison Company, El Paso Electric Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority. The proposed changes would revise the value of the minimum departure from nucleate boiling ratio (DNBR) from the current value of " $\geq 1.30$ " in the TSs to the following:

" $\geq 1.3$  (through operating cycle 10)" and  
" $\geq 1.34$  (operating cycle 11 and later)"

in the safety limits of TS 2.1.1.1 and in function 15, DNBR - Low, of TS Table 3.3.1-1, "Reactor Protective System Instrumentation."

The proposed amendments are structured such that the " $\geq 1.34$ " would become effective for each unit in operating cycle 11 and later. Operating cycle 11 begins in spring 2002 for Unit 2, in fall 2002 for Unit 1, and in spring 2003 for Unit 3. From now to operating cycle 11, the " $\geq 1.30$ " will remain the minimum DNBR requirements for the three units.

In discussions with the licensee on the proposed amendments, the licensee provided responses in an email to questions (ADAMS Accession No. ML010430115). The responses provided by the licensee clarified the description of the proposed TS amendments in its application, did not provide any additional information that was not provided in the application, did not expand the scope of the application as noticed, and did not change the staff's original proposed no significant hazards consideration determination published in the Federal Register on January 24, 2001 (66 FR 7670).

## 2.0 BACKGROUND

The purpose of the DNBR safety limit in TS 2.1.1.1 is to ensure that the minimum DNBR is not less than the limit in the safety analyses for Palo Verde. This safety limit will prevent overheating of the fuel cladding and possible cladding damage in the limiting hot channel during anticipated operational occurrences. Therefore, operating above the DNBR safety limit will prevent overheating of the fuel cladding.

The limiting safety system setting for low DNBR is specified in TS Table 3.3.1-1 and is a reactor protection system (RPS) trip setpoint. The core operating limit supervisory system (COLSS) power operating limit (POL) is an alarm limit on the maximum steady state core power level that is based on maintaining the COLSS calculated DNBR at a predetermined amount above the DNBR safety limit. The low DNBR RPS trip setpoint and the COLSS POL prevents the DNBR in the limiting coolant channel in the core from becoming less than the DNBR safety limit during anticipated operational occurrences. Therefore, the low DNBR RPS trip setpoint in TS Table 3.3.1-1, in conjunction with the COLSS POL, prevents the overheating of the fuel cladding.

## 3.0 EVALUATION

The licensee has proposed to increase the DNBR safety limit in TS 2.1.1.1 and the low DNBR RPS trip setpoint allowable value in TS Table 3.3.1-1 from the current value of " $\geq 1.30$ " to the higher value of " $\geq 1.34$ ." The proposed changes are to have the higher DNBR safety limit of 1.34 be the requirement for operating cycle 11 and future operating cycles for Palo Verde. The licensee stated that this increase is to accommodate increased DNBR sensitivity to uncertainties in inlet flow to the hot assembly and adjacent assemblies. The increased sensitivity is stated to be attributed to the flatter power distributions of the current core designs.

The licensee explained in its application that the increased DNBR sensitivity to inlet flow was first encountered in operating cycle 7 for Unit 1 and that the safety evaluation, issued by the staff on May 26, 1994, for the current DNBR safety limit of " $\geq 1.30$ " stated that uncertainties in inlet flow to the hot assembly and adjacent assemblies can be accounted for statistically by either (1) increasing the DNBR safety limit or (2) applying a thermal penalty to the COLSS and core protection calculators, using an approved statistical combination of uncertainties (SCU). At the time of the May 26, 1994, safety evaluation and up to now, the licensee accounted for the increased DNBR sensitivity by applying a thermal margin penalty to the COLSS and core protection calculators. The licensee stated that the approved SCU methods used for the existing DNBR safety limit and low DNBR RPS setpoint are described in the following document: "Modified Statistical Combination of Uncertainties," CEN-356(V)-P-A, dated May 1988, and "[Combustion Engineering] System 80™ Inlet Flow Distribution," Supplement 1-P to Enclosure 1-P to LD-82-054, dated February 1993. These documents are listed in TS 5.6.5, "Core Operating Limits Report (COLR)," as staff-approved methodology (document number 5.6.5.b.4) for establishing the core operating limits for each reload cycle.

The licensee is now proposing to account for the increased DNBR sensitivity to inlet flow by increasing the DNBR safety limit. The licensee stated that the new calculation of the DNBR safety limit was done in a joint effort between the licensee and Combustion Engineering Nuclear Power. The new calculation covers future core cycle designs. The change in safety limit will modify the reload safety analysis and RPS setpoint allowable value design bases is to

make them less confusing and to simplify the core reload process with respect to the DNBR safety limit. The statistical combination of uncertainties used for the proposed amendments is the same approved SCU methodology that was previously used and addressed in the staff's May 26, 1994, safety evaluation.

Because the proposed DNBR safety limit in TS 2.1.1.1 and the low DNBR RPS trip setpoint in TS Table 3.3-1 are calculated using staff-approved SCU methods to statistically include the increased DNBR sensitivity to inlet flow, the staff concludes that the proposed changes to the TSs are acceptable.

The staff agrees that the following proposed new requirement on the DNBR safety limit and low DNBR RPS trip setpoint allowable values will have the current limits remain applicable for plant operation through operating cycle 10 for the three units, and only have the new limits apply in operating cycle 11 and for the future or later operating cycles:

" $\geq 1.30$  (through operating cycle 10)" and " $\geq 1.34$  (operating cycle 11 and later)"

This was done because, currently, Units 1 and 3 are in operating cycle 9, and Unit 2 is in operating cycle 10. Therefore, the amendments will be effective for the three units prior to the restart of the units from the refueling outage into operating cycle 11, when the new values are applicable for plant operation. For the three units, the refueling outages prior to operating cycle 11 are scheduled as follows: fall 2002 for Unit 1, spring 2002 for Unit 2, and spring 2003 for Units 3. The amendments will be implemented within 60 days of the date of issuance.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arizona State official was notified of the proposed issuance of the amendments. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (66 FR 7670). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by

operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Jack Donohew

Date: March 28, 2001



**CONCURRENCE AND SIGNATURE TAB**

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**NRC FORM 8A**  
**(7-94)**  
**NRCMD 3.57**

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**SIGNATURE**

Mr. Gregg R. Overbeck  
Senior Vice President, Nuclear  
Arizona Public Service Company  
P. O. Box 52034  
Phoenix, AZ 85072-2034

March 28, 2001

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 -  
ISSUANCE OF AMENDMENTS TO CHANGING THE MINIMUM DEPARTURE  
OF THE NUCLEATE BOILING RATIO (TAC NOS. MB0745, MB0746, AND  
MB0747)

Dear Mr. Overbeck:

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Jack N. Donohew, Senior Project Manager, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,  
and STN 50-530

Enclosures: 1. Amendment No. 133 to NPF-41  
2. Amendment No. 133 to NPF-51  
3. Amendment No. 133 to NPF-74  
4. Safety Evaluation

cc w/encls: See next page

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