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

April 19, 1994

Mr. William F. Conway
Executive Vice President, Nuclear
Arizona Public Service Company
Post Office Box 53999
Phoenix, Arizona 85072-3999

Dear Mr. Conway:

SUBJECT: ISSUANCE OF AMENDMENTS FOR THE PALO VERDE NUCLEAR GENERATING STATION UNIT NO. 1 (TAC NO. M88211), UNIT NO. 2 (TAC NO. M88212), AND UNIT NO. 3 (TAC NO. M88213)

The Commission has issued the enclosed Amendment No. 74 to Facility Operating License No. NPF-41, Amendment No. 60 to Facility Operating License No. NPF-51, and Amendment No. 46 to Facility Operating License No. NPF-74 for the Palo Verde Nuclear Generating Station, Unit Nos. 1, 2, and 3, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated October 26, 1993, as supplemented by letter dated, March 28, 1994.

These amendments will increase the maximum allowable fuel enrichment from 4.05 weight percent U-235 to 4.30 weight percent U-235.

A copy of the related Safety Evaluation is also enclosed. A notice of issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,
Original signed by:
Timothy J. Polich, Acting Project Manager
Project Directorate IV-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 74 to NPF-41
2. Amendment No. 60 to NPF-51
3. Amendment No. 46 to NPF-74
4. Safety Evaluation

cc w/enclosures:
See next page

DISTRIBUTION:

Docket File,P1-22	NRC & Local PDRs	KPerkins, RV	Region V (12)
PDV Reading	JRoe	EAdensam	
TQuay	DFoster-Curseen	LTran	
TPolich	BHolian	OGC,15-B-18	
DHagan,MNBB-3206	GHill (6)P1-37	CGrimes,11-E-22	
OPA,2-G-5	OC/LFDCB,MNBB-11104	ACRS (10)P-315	

OFC	PDV/LA	PDV/PM	PDV/PM	SRXB	OGC	D/PDV
NAME	DFoster-Curseen	LTran	TPolich	RJones		TQuay
DATE	3/30/94	3/30/94	3/30/94	3/31/94	4/6/94	4/19/94

OFFICIAL RECORD COPY DOCUMENT NAME: PV88211.AMD

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

April 19, 1994

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

Mr. William F. Conway
Executive Vice President, Nuclear
Arizona Public Service Company
Post Office Box 53999
Phoenix, Arizona 85072-3999

Dear Mr. Conway:

SUBJECT: ISSUANCE OF AMENDMENTS FOR THE PALO VERDE NUCLEAR GENERATING STATION UNIT NO. 1 (TAC NO. M88211), UNIT NO. 2 (TAC NO. M88212), AND UNIT NO. 3 (TAC NO. M88213)

The Commission has issued the enclosed Amendment No. 74 to Facility Operating License No. NPF-41, Amendment No.60 to Facility Operating License No. NPF-51, and Amendment No.46 to Facility Operating License No. NPF-74 for the Palo Verde Nuclear Generating Station, Unit Nos. 1, 2, and 3, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated October 26, 1993, as supplemented by letter dated March 28, 1994.

These amendments will increase the maximum allowable fuel enrichment from 4.05 weight percent U-235 to 4.30 weight percent U-235.

A copy of the related Safety Evaluation is also enclosed. A notice of issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

Timothy J. Polich, Acting Project Manager
Project Directorate IV-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No.74 to NPF-41
2. Amendment No.60 to NPF-51
3. Amendment No.46 to NPF-74
4. Safety Evaluation

cc w/enclosures:
See next page

Mr. William F. Conway
Arizona Public Service Company

Palo Verde

cc w/enclosures:
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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 NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 74
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 October 26, 1993, as supplemented by letter dated March 28, 1994, 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. 74, 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 must be fully implemented no later than 45 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Theodore R. Quay, Director
Project Directorate IV-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 1994

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 74 TO FACILITY OPERATING LICENSE NO. NPF-41

DOCKET NO. STN 50-528

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

Remove	Insert
5-5	5-5

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 241 fuel assemblies with each fuel assembly normally containing 236 fuel rods or burnable poison rods clad with Zircaloy-4 except that limited substitution of fuel rods by filler rods consisting of Zircaloy-4 or stainless steel may be made if justified by a cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 150 inches and contain a maximum total weight of approximately 1950 grams uranium. Each burnable poison rod shall have a nominal active poison length of 136 inches. The initial core loading shall have a maximum enrichment of 3.35 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum radially averaged enrichment of 4.30 weight percent U-235 at any axial location.*

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 76 full-length and 13 part-length control element assemblies.

5 4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The Reactor Coolant System is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant of the applicable surveillance requirements,

b. For a pressure of 2500 psia, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

VOLUME

5.4.2 The total water and steam volume of the Reactor Coolant System is 13,900 + 300/-0 cubic feet at a nominal T_{avg} of 593°F.

---

*No fuel with an enrichment greater than 4.0 weight percent U-235 shall be stored in a high density mode in the spent fuel storage facility.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

5.6.1 CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A k_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance of 2.6% delta k/k for uncertainties as described in Section 9.1 of the FSAR.

b. A nominal 9.5 inch center-to-center distance between fuel assemblies placed in the storage racks in a high density configuration.

5.6.1.2 The k_{eff} for new fuel for the first core loading stored dry in the spent fuel storage racks shall not exceed 0.98 when aqueous foam moderation is assumed.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 137 feet - 6 inches.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1329 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Tables 5.7-1 and 5.7-2.

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 NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 60
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 October 26, 1993, as supplemented by letter dated March 28, 1994, 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 Part 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. 60, 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 must be fully implemented no later than 45 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Theodore R. Quay

Theodore R. Quay, Director
Project Directorate IV-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 1994

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 60 TO FACILITY OPERATING LICENSE NO. NPF-51

DOCKET NO. STN 50-529

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

Remove	Insert
5-5	5-5

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 241 fuel assemblies with each fuel assembly normally containing 236 fuel rods or burnable poison rods clad with Zircaloy-4 except that limited substitution of fuel rods by filler rods consisting of Zircaloy-4 or stainless steel may be made if justified by a cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 150 inches and contain a maximum total weight of approximately 1950 grams uranium. Each burnable poison rod shall have a nominal active poison length of 136 inches. The initial core loading shall have a maximum enrichment of 3.35 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum radially averaged enrichment of 4.30 weight percent U-235 at any axial location.*

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 76 full-length and 13 part-length control element assemblies.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The Reactor Coolant System is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant of the applicable surveillance requirements,

b. For a pressure of 2500 psia, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

VOLUME

5.4.2 The total water and steam volume of the Reactor Coolant System is 13,900 + 300/-0 cubic feet at a nominal T_{avg} of 593°F.

---

*No fuel with an enrichment greater than 4.0 weight percent U-235 shall be stored in a high density mode in the spent fuel storage facility.

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

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-530

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 46
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 October 26, 1993, as supplemented by letter dated March 28, 1994, 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. 46, 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 must be fully implemented no later than 45 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Theodore R. Quay

Theodore R. Quay, Director
Project Directorate IV-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 1994

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 46 TO FACILITY OPERATING LICENSE NO. NPF-74

DOCKET NO. STN 50-530

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

Remove	Insert
5-5	5-5

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 241 fuel assemblies with each fuel assembly normally containing 236 fuel rods or burnable poison rods clad with Zircaloy-4 except that limited substitution of fuel rods by filler rods consisting of Zircaloy-4 or stainless steel may be made if justified by a cycle specific reload analysis. Substitution of up to a total of 80 fuel rods clad with zirconium-based alloys other than Zircaloy-4 may also be made in two fuel assemblies for in-reactor performance evaluation purposes during Cycles 4, 5 and 6. Each fuel rod shall have a nominal active fuel length of 150 inches and contain a maximum total weight of approximately 1950 grams uranium. Each burnable poison rod shall have a nominal active poison length of 136 inches. The initial core loading shall have a maximum enrichment of 3.35 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum radially averaged enrichment of 4.30 weight percent U-235 at any axial location.*

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 76 full-length and 13 part-length control element assemblies.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The Reactor Coolant System is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant of the applicable surveillance requirements,

b. For a pressure of 2500 psia, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

VOLUME

5.4.2 The total water and steam volume of the Reactor Coolant System is 13,900 + 300/-0 cubic feet at a nominal T_{avg} of 593°F.

---

*No fuel with an enrichment greater than 4.0 weight percent U-235 shall be stored in a high density mode in the spent fuel storage facility.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

5.6.1 CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A k_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance of 2.6% delta k/k for uncertainties as described in Section 9.1 of the FSAR.

b. A nominal 9.5 inch center-to-center distance between fuel assemblies placed in the storage racks in a high density configuration.

5.6.1.2 The k_{eff} for new fuel for the first core loading stored dry in the spent fuel storage racks shall not exceed 0.98 when aqueous foam moderation is assumed.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 137 feet - 6 inches.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1329 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Tables 5.7-1 and 5.7-2.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 74 TO FACILITY OPERATING LICENSE NO. NPF-41,

AMENDMENT NO.60 TO FACILITY OPERATING LICENSE NO. NPF-51,

AND AMENDMENT NO. 46 TO FACILITY OPERATING LICENSE NO. NPF-74

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNIT NOS. 1, 2, AND 3

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

1.0 INTRODUCTION

By application dated October 26, 1993, as supplemented by letter dated March 28, 1994, Arizona Public Service Company (APS or the licensee) requested an amendment to the Technical Specifications (TS) for the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3 (Appendix A to Facility Operating License Nos. NPF-41, NPF-51, and NPF-74, respectively). The Arizona Public Service Company 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 additional information contained in the supplemental letter dated March 28, 1994, was clarifying in nature and thus within the scope of the initial notice and did not affect the NRC staff's proposed no significant hazards consideration determination.

2.0 DISCUSSION

The licensee is requesting a revision to TS 5.3.1 for PVNGS Units 1, 2, and 3 that will increase the maximum allowable fuel enrichment from 4.05 weight percent U-235 to 4.30 weight percent U-235. There was no change requested to the current 52,000 MWD/MTU burnup. The licensee provided supplemental information at the request of the NRC to bring TS 5.3.1 into conformance with Generic Letter 90-02, Supplement 1 and to clarify the assumptions used in the Fuel Handling Accident Analysis.

A previous submittal to increase the fuel enrichment from 4.0 to 4.05 weight percent U-235 was granted March 9, 1988. That submittal included a Combustion Engineering letter dated May 27, 1987, which verified that the original analyses of the new fuel, spent fuel (except as noted below) and the

intermediate racks, as well as the fuel elevator, fuel upender, and transfer machine were all performed for 4.30 weight percent U-235 fuel. Since the k_{eff} values based on the storage of 4.30 weight percent U-235 fuel meet the NRC acceptance criteria of no greater than 0.95 for fully flooded (unborated) conditions and 0.98 for optimum moderation conditions, the PVNGS storage facilities were found acceptable for the storage of 4.05 weight percent U-235 fuel with one exception.

The spent fuel racks with neutron poison (boron) boxes in the cells were only analyzed for a maximum enrichment of 4.0 weight percent U-235 using the high density mode. Therefore, a footnote that states, "No fuel with an enrichment greater than 4.0 weight percent U-235 shall be stored in high density mode in the spent fuel storage facility," was added to TS 5.3.1.

The spent fuel storage racks are made up of 17 individual modules, twelve 8x9 assembly arrays, four 8x12 assembly arrays, and a 9x9 assembly array. The storage racks are stainless steel honeycomb structures with rectangular storage cells. A cell blocking device is used in every other storage rack location which produces a checkerboard array of fueled and non-fueled locations. In each fueled location, a stainless steel "L" shaped insert is used to position the fuel and maintain the minimum edge-to-edge spacing between assemblies.

The new fuel storage racks consist of a 15x6 assembly array divided into two compartments which are separated from each other by a two-foot concrete wall. In the long direction there is a minimum 9-inch edge-to-edge separation between assemblies and in the shorter perpendicular direction there is a minimum 22-inch edge-to-edge separation between assemblies. The new fuel storage rack design encloses each assembly in a stainless steel box with a minimum thickness equal to 0.10 inches.

3.0 EVALUATION

The licensee has requested a technical specification change for a maximum fuel enrichment to be increased from 4.05 weight percent U-235 to a radially averaged 4.30 weight percent enrichment. As stated in the discussion section above, the original analyses of the PVNGS spent fuel pools with high density storage configuration supported a maximum enrichment limit of 4.0 weight percent U-235. The checkerboard storage configuration was analyzed with a maximum uniform enrichment of 4.30 weight percent U-235. In addition, the dry new fuel storage racks were originally analyzed for a maximum uniform enrichment of 4.30 weight percent U-235.

Spent Fuel Storage Racks

The two dimensional discrete ordinates transport code DOT-IV was used to determine the spatial solution and multiplication factor in the spent fuel storage racks. The CEPAK lattice program was used to calculate the four neutron energy group cross-sections for fuel, water, and steel regions. The data base for both fast and thermal neutron cross-sections for the CEPAK program were derived from several sources, mainly ENDF/B-IV. These codes are

widely used in the nuclear industry and have been benchmarked to adequately reproduce the critical values. The group dependent poison cross-sections, if poison inserts were present in the array, were generated by a 123-group, P-3, S-8 XSDRNPM calculation. The staff concludes that the resulting set of four-group poison cross-sections properly account for epithermal self-shielding. Therefore, the staff finds the use of these codes acceptable.

The geometric buckling was supplied to CEPAK from DOT X-Y transport solution for a fuel assembly in the rack environment. The staff concludes that the geometric buckling calculated in this manner is indicative of the neutron environment of the fuel assembly in the spent fuel rack and is, therefore, acceptable.

The PVNGS spent fuel racks were modeled with a nominal pitch of 9.515 inches. In each fueled location, a stainless steel "L" shaped insert with a nominal thickness equal to 0.175 inches was modeled. Periodic boundary conditions were employed to correctly account for the arrangement of fuel locations with the steel inserts and the non-fueled locations.

The modeling of the spent fuel rack assumed no axial leakage, no poison shims present in the assemblies, no grids, and no soluble boron in 68 degree Fahrenheit water. The nominal pitch of fuel cells modeled for the 16x16 assembly is 0.506 inches.

The original analysis of the PVNGS spent fuel racks assumed that the assemblies were uniformly enriched to 4.30 weight percent U-235, the pellet diameter was 0.325 inches, the stack density of uranium dioxide in each rod was 10.061 g/cc. The calculated k_{eff} value for the original nominal configuration was 0.88980.

The updated analysis included the reactivity effects of the radially averaged versus uniformly enriched fuel, a higher stack density (10.41 g/cc), and a larger pellet diameter (0.33 inches). The calculated reactivity effects in delta k_{eff} units was 0.00200 for the radially averaged 4.30 weight percent fuel, 0.00400 for the higher stack density, and 0.00200 for the larger pellet diameter. Thus the calculated k_{eff} value for the new nominal configuration was found to be 0.89780 (0.88980 + 0.00200 + 0.00400 + 0.00200).

The delta k_{eff} for uncertainties in delta k_{eff} units was 0.00455 for the minimum center to center pitch, 0.00942 for the eccentric positioning of assemblies, 0.00184 for the minimum monolith thickness, 0.00442 for temperature variations, 0.00150 for the minimum L-insert thickness, 0.00350 for the assembly enrichment, and 0.00714 for the methodology uncertainty.

The square root of the sum of the uncertainties squared is equal to 0.01407 delta k_{eff} units. The calculation methodology has a bias equal to -0.00197 delta k_{eff} units. Therefore, the final k_{eff} value for the PVNGS spent fuel racks is equal to 0.90990 (0.89780 + 0.01407 - 0.00197). The design basis of k_{eff} value for spent fuel storage racks is 0.95. Therefore, sufficient margin between the final calculated k_{eff} value and the design basis was demonstrated.

New Fuel Storage Racks

The new fuel storage array was modeled using KENO by assuming the entire array of 4.30 weight percent U-235 assemblies were enclosed by a tight fitting two-foot thick concrete reflector. The analysis considered hydrogenous moderation ranging from foam conditions (equivalent water densities of 0.0 g/cc to 0.10 g/cc) up to full flood conditions. The resulting k_{eff} versus water density data exhibits two peaks; one from 0.06 to 0.07 g/cc water density, and one at full flood condition. The nominal calculated k_{eff} value at 0.0625 g/cc water density was less than 0.80. The nominal calculated k_{eff} value at full flood conditions was less than 0.90. Both of these calculated k_{eff} values are below the design basis of 0.98 under conditions of optimum moderation and 0.95 when flooded. Therefore, sufficient margin between the final calculated k_{eff} values and the design bases were demonstrated.

Evaluation Summary

The licensee has proposed a change to Section 5.3.1 of the Technical Specifications. The analysis submitted by the licensee were performed using well established methods with conservative assumptions. The results were within staff limits for the maximum k_{eff} for the various scenarios analyzed. Since no analysis for high density storage in the spent fuel racks was presented, the current checkerboarding restriction on the spent fuel storage racks will continue to apply.

Based on the above review and evaluation, the staff concludes that fuel assemblies having radially averaged enrichments up to 4.30 weight percent U-235 and 52,000 MWD/MTU burnup may be safely stored in the new and spent fuel storage racks at PVNGS.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact was published in the FEDERAL REGISTER on April 12, 1994 (59 FR 17402).

Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of these amendments will not have a significant effect on the quality of the human environment.

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

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