May 23, 2000

Mr. J. V. Parrish
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: WNP-2 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION 4.3, "FUEL STORAGE" (TAC NO. MA7228)

Dear Mr. Parrish:

The Commission has issued the enclosed Amendment No. 163 to Facility Operating License No. NPF-21 for WNP-2. The amendment consists of changes to the Technical Specification (TS) in response to your application dated November 18, 1999, as supplemented by letter dated February 7, 2000.

The amendment revises Subsection 4.3.1.2.b of TS 4.3, "Fuel Storage," to change the limitations for placement of fuel in the new fuel storage racks.

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 Cushing, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures: 1. Amendment No. 163 to NPF-21
2. Safety Evaluation

cc w/encls: See next page

*For previous concurrences
see attached ORC

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

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Jack Cushing, Project Manager, Section 2
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Docket No. 50-397

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2. Safety Evaluation

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

ENERGY NORTHWEST

DOCKET NO. 50-397

WNP-2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 163
License No. NPF-21

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Energy Northwest dated November 18, 1999, as supplemented by letter dated February 7, 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-21 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. 163 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from 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: May 23, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 163

FACILITY OPERATING LICENSE NO. NPF-21

DOCKET NO. 50-397

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains vertical lines indicating the areas of change. The corresponding overleaf page is also provided to maintain document completeness.

REMOVE	INSERT
4.0-2	4.0-2

4.0 DESIGN FEATURES

4.1 Site Location

4.1.1 Site and Exclusion Area Boundaries

The site area shall include the area enclosed by the exclusion area plus the plant property lines that fall outside the exclusion area, as shown in Figure 4.1-1. The exclusion area boundary is a circle with its center at the reactor and a radius of 1950 meters.

4.1.2 Low Population Zone

The low population zone is all the land within a circle with its center at the reactor and a radius of 4827 meters.

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 764 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material and water rods or channels. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all safety design bases. A limited number of lead fuel assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 185 cruciform shaped control rod assemblies. The control material shall be boron carbide and hafnium metal as approved by the NRC.

(continued)

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

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

a. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.2 of the FSAR; and

b. A nominal 6.5 inch center to center distance between fuel assemblies placed in the storage racks.

4.3.1.2 The new fuel storage racks are designed and, will fuel assemblies inserted, shall be maintained with:

a. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.1 of the FSAR; and

b. A maximum of 60 new fuel assemblies stored in the new fuel storage racks, arranged in 6 spatially separated zones. Within a storage zone, the nominal center-to-center distance between cells for storing fuel assemblies is 14 inches. The nominal center-to-center distance between cells for storing fuel assemblies in adjacent zones is 37 inches. Design features relied upon to spatially limit the placement of fuel bundles within the new fuel vault are required to be installed prior to placement of new fuel bundles in the vault.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 583 ft 1.25 inches.

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 2658 fuel assemblies.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 163 TO FACILITY OPERATING LICENSE NO. NPF-21

ENERGY NORTHWEST

WNP-2

DOCKET NO. 50-397

1.0 INTRODUCTION

By application dated November 18, 1999, as supplemented by letter dated February 7, 2000, Energy Northwest (the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. NPF-21) for WNP-2. Specifically, Energy Northwest is requesting a revision to Subsection 4.3.1.2.b of Technical Specification (TS) 4.3, "Fuel Storage," to revise the wording that defines the limitations for placement of fuel in the new fuel storage facility.

The WNP-2 current TS and the associated bases conforms to the new and improved TS as documented by NUREG-1434. Although the current wording of TS 4.3.1.2.b correctly describes the new fuel vault rack spacing associated with the original rack design, it does not accurately reflect the current design features and controls relied upon to adequately limit the spacing of new fuel assemblies in the new fuel vault, as required to ensure compliance with subsection 4.3.1.2.a. of TS 4.3.1 under all postulated conditions. This situation constitutes a degraded or non-conforming condition pursuant to the guidance of U.S. Nuclear Regulatory Commission's (NRC) Administrative Letter 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety," December 29, 1998. The amendment to Subsection 4.3.1.2.b of TS 4.3.1 addresses this non-conforming condition.

A telephone conference was held on December 14, 1999, with the licensee's staff to discuss the technical issues related to this proposed amendment. Subsequently, a request for additional information (RAI) was forwarded to the licensee by letter dated January 3, 2000. Energy Northwest responded to the RAI by letter dated February 7, 2000.

The supplemental letter dated February 7, 2000, provided clarifying information, did not expand the scope of the application as originally noticed and did not change the staff's original proposed no significant hazards consideration determination published in the *Federal Register* on December 29, 1999 (64 FR 73088).

2.0 EVALUATION

The new fuel storage facility at WNP-2 is a dry storage concrete facility in which air is the medium surrounding the stored fuel. The basis for the licensee's request to amend TS

4.3.1.2.b is its decision (1) to limit the number of fuel assemblies that may be stored in the new fuel storage facility, and (2) to establish geometrical limitations for storing new fuel assemblies in the racks. Mainly, the amendment involves certain changes in the wording of TS Subsection 4.3.1.2.b. Instead of the current TS wording specifying the center-to-center spacing of 7.0 inches within the rows and 12.25 inches between the rows in the new fuel storage racks, the revised TS Subsection 4.3.1.2.b will specify the following:

> A maximum of 60 new fuel assemblies will be stored in new fuel storage racks which will be arranged in six (6) spatially separated zones. The nominal center-to-center distance between cells storing fuel assemblies within a storage zone is 14 inches, and the center-to-center distance between cells in adjacent zones is 37 inches. Design features needed to spatially limit the placement of the fuel bundles within the new fuel vault shall be installed prior to fuel placement in the vault.

The reason for the increase in the center-to-center distances between the cells is the new cell utilization pattern which consists of two contiguous rows to store fuel assemblies, alternating with two contiguous rows in which fuel storage is prohibited. Within the 2-row set in which fuel is stored, alternate cells are physically blocked in a checkerboard pattern to prevent inadvertent cell usage. This arrangement increases the nominal center-to-center distance between cells to 14 inches within a storage zone. Because the fuel storage is prohibited in sets of two alternate contiguous rows, the center-to-center distance between cells in adjacent zones is increased to 37 inches.

2.1 Structural Evaluation

In response to a staff question regarding the integrity of the various structural elements affected by the new geometrical limitations for storing the fuel assemblies using templates in the new racks, the licensee reported the details of construction of the templates and working platform grating sections. Although no changes were made in the concrete structure of the new fuel storage vault, the licensee performed an analysis to verify the structural integrity of the new fuel racks resulting from the new geometrical limitations of the new fuel rack support system. Each template is made from 1/4-inch aluminum plate and is a nonstructural element that adds no weight to the fuel rack beams or other supports. The template is securely mounted on and fastened to the working platform grating. The working platform is supported from the new fuel storage vault cover lip, independent from the fuel rack beams or their vault wall support box beams. This arrangement ensures that neither the templates nor the working platforms impose any loading onto the fuel rack or its support system.

The licensee further reported that the pedestal supporting the fuel assembly is constructed of 3½-inch stainless steel schedule 40 pipe, and that the strength characteristics of the pedestal are sufficient to support the fuel assembly in the receptor cell in the lower fuel rack beam. The new fuel storage vault rack support system is composed of three levels of fuel rack beams supported by box beams attached to the walls of the vault. The upper two fuel rack beams hold the fuel laterally, and the lower fuel rack beam holds the fuel vertically and laterally when an assembly is fully inserted. In order to check the uplift potential of the fuel assembly mounted in the pedestal, the licensee reviewed the floor response spectra, calculated the vertical load on any lower fuel rack beam, and found it to be less than 55 percent of the original load. The

licensee also found that the forces from the safe shutdown earthquake for the new fuel assembly support system were below 1.0 g in the vertical direction. This assures that there will be no vertical uplift of the fuel assembly, and that the insertion of the pedestal will have no adverse structural impact in the vertical direction.

In the lateral direction, the licensee's analysis indicated that, when the 42-inch pedestal is inserted, only the center and upper fuel rack beams essentially carry the lateral load by virtue of the configuration of the rack beams and the pedestal, as shown in Diagram 3 in the licensee's letter dated February 7, 2000. Furthermore, since only half of the fuel assemblies are stored (from that originally designed), the upper fuel rack beams will carry loads equal to the original load, while the center fuel rack beams will carry loads less than the original load. Based on this analysis, the staff agrees with the licensee's conclusion that sufficient design margins exist for fuel rack loads.

In response to a staff question regarding the strength capacities of the various structural elements of the new fuel storage facility, the licensee reported that the proposed TS change provides for only one-half the number of original design fuel assemblies in any single fuel rack row and one-fourth of the total number of original design fuel assemblies in the new fuel storage vault. Since the templates and working platform gratings are supported independently from the racks, they do not affect the strength of the new fuel storage facility's structural elements. The licensee has further stated that the strength capacities of Table 3.9-2 in the Final Safety Analysis Report (FSAR) are maintained.

Regarding a staff query concerning the accidental drop of the fuel assemblies, the licensee has stated that the configuration control components would not adversely affect the configuration or integrity of the new fuel assembly, and that they would not cause an accidental fuel drop. The licensee further stated that the new configuration control components do not affect the previous testing results of accidental fuel drops on the fuel racks or vault floors described in the FSAR Section 9.1.1.3.2. While the staff accepts the licensee's responses to its queries, the staff notes that the licensee should revise the affected FSAR sections, incorporating the salient features of its responses to the staff's questions discussed above.

Based on its review and evaluation of the licensee's submittal and the subsequent response to the staff's request for additional information, the staff concludes that the licensee's structural analyses of the new fuel storage racks, considering the seismic and accident loading conditions, are in compliance with the acceptance criteria specified in the FSAR and are consistent with the current licensing practice. However, the staff notes that the licensee should revise the affected FSAR sections incorporating the salient features of its original submittal and its subsequent responses to the staff's questions related to its submittal.

2.2 Reactivity Evaluation

New fuel is normally stored dry in storage vaults with air as the medium surrounding the stored fuel. However, to meet the criteria stated in Section 9.1.1, "New Fuel Storage," of the NRC Standard Review Plan (SRP), K_{eff} must not exceed 0.95 with the racks fully loaded with fuel of the highest anticipated reactivity and flooded with unborated water. Furthermore, K_{eff} must be no greater than 0.98 under low-density (optimum moderation) conditions. The maximum calculated reactivity must include a margin for uncertainties in reactivity calculations and in

manufacturing tolerances such that K_{eff} will not exceed these limits at a 95 percent probability, with a 95 percent confidence (95/95) level.

The licensee performed its analysis of the reactivity effects of the fuel storage in the new fuel storage vault with the computer codes KENO-Va, a 3D Monte Carlo criticality code and PHOENIX-2 2D lattice transport theory code. PHOENIX calculates the cross-sections to be used by KENO. KENO performs reactivity (criticality) calculations for the dry storage vault. The analytical methods and models used in the reactivity analysis are widely used for the analysis of fuel rack reactivity and have been benchmarked against results from numerous critical experiments.

Calculations were performed to simulate the WNP-2 fuel storage vault as realistically as possible with respect to parameters important to reactivity such as enrichment, assembly spacing, and moderator properties. The calculations assumed fuel enrichment of 5.0% w/o U-235, with the same enrichment in all rods, and no credit was taken for gadolinium; the temperature was taken to be 20 ^{o}C at atmospheric pressure.

The cell configuration pattern for the fuel consists of 2 contiguous rows in which fuel assemblies may be stored, alternating with 2 contiguous rows in which fuel storage is prohibited. Within a 2-row set in which fuel is stored, alternate cells are physically blocked, in a checkerboard pattern, to prevent inadvertent cell usage. This results in a nominal center-to-center distance between cells for storing fuel assemblies of 14 inches. The nominal center-to-center distance between cells used to store fuel, across the 2-row set in which fuel storage is prohibited, is 37 inches.

The above configuration was analyzed to determine the effective neutron multiplication factor, K_{eff}, for (1) geometrical variations resulting from tolerances for the installation, (2) air as the vault atmosphere, and (3) flooding the vault with water varying in densities from 1 to 0.02 gm./cc. Varying the water density in the vault will result in obtaining an optimum moderation. This is in accordance with the design basis for preventing criticality outside the reactor. These design bases specify that including uncertainties, there is a 95 percent probability at a 95 percent confidence level (95/95 probability/confidence) that the effective multiplication factor (K_{eff}) of the fuel assembly array will be no greater than 0.95 when fully moderated by unborated water and no greater than 0.98 when moderated by reduced density hydrogenous material as foam or mist (optimum moderation).

2.2.1 Postulated Accidents

The licensee also analyzed postulated accidents, such as: assemblies dropped on the vault floor and insertion patterns that varied from the baseline configuration described above. The analysis did not include credit for neutron absorptive effects of the metals comprising the storage rack, the gadolinium and the zirconium cladding in the fuel assemblies. No neutron losses were assumed to take place in the metal of the concrete structure of the vault. The results of the analysis indicate that K_{eff} ranges between 0.64 and 0.86 for normal geometry and is 0.898 for worst-case accident involving an insertion pattern (miss-placed bundle) that varied from the specified baseline configuration. The analyzed dropped fuel bundle accident resulted in a K_{eff} ranging from 0.87 to 0.88. Technical Specification 4.3.1.2.a specifies a limiting value of 0.95 for K_{eff} when the vault is fully flooded with unborated water.

These values are within the staff guidelines stated in Standard Review Plan Section 9.1.1 of 0.98 and 0.95, respectively. In addition, the reactivity effects of mechanical uncertainties (e.g., center-to-center spacing) have been incorporated at the 95/95 probability/confidence level. This meets the staff's acceptance criteria and is acceptable.

2.3 Technical Specification Changes

The proposed amendment (changes to the current wording) to Subsection 4.3.1.2.b of TS 4.3.1, "Criticality" would limit the number of fuel assemblies that may be stored in a facility, and establish geometrical limitations for storage of new fuel assemblies in the racks. The proposed changes to Subsection 4.3.1.2.b are as follows (changes are italicized and highlighted):

4.3.1.2 The new fuel storage racks are designed and, ***with assemblies inserted***, shall be maintained with:

a. (No changes)

b. ***A maximum of 60 new fuel assemblies stored in the new fuel storage racks, arranged in 6 spatially separated zones. Within a storage zone, the nominal center-to-center distance between cells for storing fuel assemblies is 14 inches. The nominal center-to-center distance between cells for storing fuel assemblies in adjacent zones is 37 inches. Design features relied upon to spatially limit the placement of fuel bundles within the new fuel vault are required to be installed prior to placement of new fuel bundles in the vault.***

The staff finds the changes to the wording to Subsection 4.3.1.2.b of TS 4.3.1, "Criticality," to be acceptable.

The licensee has proposed to amend Subsection 4.3.1.2.b of TS 4.3.1, "Criticality" to reflect the new geometric configuration. In support of this requested amendment, analyses were submitted by the licensee that are conservative in that they were performed for 5.0 percent fuel enrichment. In addition, the computer code(s) PHOENIX and KENO analyses results were within staff limits for maximum K_{eff} for the various scenarios stated above. Consequently, the staff concludes that the proposed change is consistent with the results of the criticality analyses provided, and is, therefore acceptable.

The staff concludes that the licensee's structural analyses of the new fuel storage racks, considering the seismic and accident loading conditions, are in compliance with the acceptance criteria specified in the FSAR and are consistent with the current licensing practice. However, the staff notes that the licensee should revise the affected FSAR sections, incorporating the salient features of its original submittal and its subsequent responses to the staff's questions related to its submittal.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 73088). Accordingly, the amendment meets 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 amendment.

5.0 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.

Principal Contributors: A. Attard
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Date: May 23, 2000