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SUBJECT: Application for amend to license NPF-21,consisting of WNP-2 TS,Section 5.3.2 Control Rod Assemblies & Safety Evaluation.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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March 15, 1993
G02-93-060

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
REQUEST FOR AMENDMENT TO TECHNICAL SPECIFICATIONS: CONTROL ROD ASSEMBLIES

Reference: GE-NE-778-028-0790, Revision 2, "GE Duralife 215 Control Rod Safety Evaluation," GE Nuclear Energy, July 1992.

In accordance with the Code of Federal Regulations, Title 10, Parts 50.90 and 2.101, the Supply System hereby submits a request for amendment to the WNP-2 Technical Specifications, Section 5.3.2 Control Rod Assemblies. The reference provides the design analysis of the Duralife 215 control rod, intended for use as replacement control rods in WNP-2. According to the General Electric (GE) safety evaluation and 10 CFR 50.59 review for the Duralife 215, NRC review and approval of the Duralife 215 design was not requested by GE because the NRC had already reviewed and approved each of the components of the Duralife 215 design in SER's for the Duralife 160, 190 and 230 control rod designs. The 10 CFR 50.59 review by GE revealed no unreviewed safety questions. For additional information during the review of this request, the proprietary reference is included as an attachment.

Several of the original, all B_4C control rods supplied with WNP-2 are approaching end of life. The Supply System proposes to replace these control rods with Duralife 215 control rods. GE designed the Duralife 215 to be a direct replacement for the original control rods. The Duralife 215 has been evaluated to be compatible in form, fit, and function with the original control rods. Compatibility includes configuration, mechanical capability, nuclear performance, hardware interfaces, and system performance.

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The Duralife 215 design differs from the original control rods in some respects yet continues to meet the design and performance criteria of the original control rods. The main structural member of the Duralife 215 is made of stainless steel and consists of a top handle, a tie rod, a bottom control rod drive coupling/velocity limiter, and a four piece, cruciform sheath containing the neutron absorber. The handle, tie rod, drive coupling, and sheath are fusion welded into a single structure. The neutron absorber in each wing of the sheath consists of 18 high purity stainless steel tubes filled with B_4C (B_4C tubes), three hafnium rods at the tip of each wing, and a hafnium plate at the top. The original control rods have 19 smaller B_4C tubes and no hafnium.

An increase in B_4C volume and the addition of hafnium substantially increase control rod nuclear life in the Duralife 215 compared to the original control rods. As indicated above, each wing of the Duralife 215 has 18 B_4C tubes with an inside diameter of 0.148 inch, compared to the 19 B_4C tubes with an inside diameter of 0.138 inch in the original control rods. The outside diameter remains the same. The length of the 18 B_4C tubes in the Duralife 215 is reduced from 143 inches to 137 inches to accommodate the 6 inch high hafnium plate at the top. The three hafnium rods at the tip of each wing have a diameter of 0.188 inch. The increased absorber capability of the Duralife 215 translates into a 3.0% increase in cold reactivity worth. The advantages of increased cold reactivity are slight increases in shutdown margin and scram reactivity.

All basic interface dimensions are the same, except control rod thickness. The Duralife 215 thickness is 8 mils greater because of increased sheath thickness. However, the envelope tolerances of the original control rods are met. The rollers on the handle of the Duralife 215, which guide the control rod between fuel assemblies, have the same diameter as the rollers on the original control rods. As a consequence, the Duralife 215 is completely interchangeable with the original control rods and fully compatible with Nuclear Steam Supply System hardware.

GE has evaluated mechanical stress, strain, and fatigue performance and determined that the Duralife 215 will not fail under loading due to shipping, handling, normal operation, transients, including scrams and jogging, and seismic events. Duralife 215 performance is well within the design criteria limits for the WNP-2 original control rods. The differences in the Duralife 215 which impact the mechanical analyses are the reduced B_4C tube thickness, increased control rod weight, the fusion welded structure, sheath thickness, and the longer nuclear lifetime (increased neutron fluence). Considering each of these differences, the GE analysis shows that none of the aforementioned loads will exceed the ultimate stress and strain or fatigue criteria of the Duralife 215 materials. The most limiting loads imposed on control rods occur during scrams, and the Duralife 215 analysis is bounded by the analyses and tests for the NRC approved Duralife 230. The longer lifetime of the Duralife 215 means that its fatigue usage will be greater than for the original control rods, but the fatigue usage of the Duralife 215 is bounded by the fatigue usage of the NRC approved Duralife 230.

Control rods perform the dual function of power shaping and reactivity control. For power shaping the Duralife 215 has comparable reactivity worth to the original control rods and thus will have comparable power shaping capability. Because the power shaping capability does not change, the results from the analyses of the licensing basis transients and accidents affected by power shape, the reload control rod pattern projections, or core physics calculations will not change beyond allowable limits.

For reactivity control the reactivity worth, rate of insertion and rod drop speeds must be considered in safety evaluations. GE analysis and testing show that the Duralife 215 has equivalent reactivity worth as compared to the original control rods. The design changes made to the Duralife 215 extend the lifetime of the control rod. This is accomplished by greater structural strength and corrosion resistance to maintain insertion capability and by the addition of hafnium components to prevent premature burnout in the high flux region of the control rod. These changes were designed under the requirement that the Duralife 215 match all the safety and operational capabilities of the original control rods. The GE analysis and testing support this conclusion.

The Duralife 215 has been evaluated to assure that it can be inserted during normal, abnormal, emergency, and faulted modes of operation within the limits assumed in the plant analyses. The analyses consider the effects of manufacturing tolerances, swelling, and irradiation growth and include the time dependent effect of corrosion. These effects, alone or together, could impact the rate of insertion or rod drop speeds of a control rod. The Duralife 215 has been determined to operate successfully to end of life with no change in insertion capabilities compared to the original control rods. The Duralife 215 is 18 pounds heavier than the original control rods which leads to a negligible increase in scram insertion time. This increase is negligible because it is within the error band in the licensing basis for measuring scram insertion time.

For rod drop accident considerations, the velocity limiter has been designed to meet the maximum-velocity limits of the original control rods and thus will not affect the existing control rod drop accident analysis. Based on bounding the GE analysis, the Duralife 215's increased reactivity is not sufficient to lead to a significant change in the enthalpy deposited in fuel as a result of the rod drop accident. The Duralife 215, in short, does not functionally change the WNP-2 licensing basis because its behavior is not significantly different from that of the original control rods.

The Supply System has reviewed the changes per 10 CFR 50.92 and provides the following in support of a finding for no significant hazards consideration.

1) Control rod replacement does not involve a significant increase in the probability or consequences of an accident previously evaluated because the replacement control rod design performs similarly to or better than the original control rods. The Duralife 215 is designed to have increased corrosion resistance and structural integrity compared to the original control rods. This reduces the probability of a stuck rod and of the control rod drop accident. The power shaping capability is comparable between the two designs so the Duralife 215 will have no impact on the consequences of licensing basis transients and accidents affected by power shape. Scram reactivity and insertion times are unchanged with respect to the sensitivity of the licensing basis analysis and, therefore, will not impact the consequences of any accidents impacted by reactor scram. Rod drop velocities and the enthalpy deposited in the fuel as a result of a rod drop accident are also within the bounds of the licensing basis analysis, so the consequences of this accident are not impacted. For these reasons the replacement of the original control rods with Duralife 215 control rods does not represent a significant increase in the probability or consequences of a previously evaluated accident or transient.

2) Control rod replacement does not create the possibility of a new or different kind of accident from any accident previously evaluated because the proposed change does not introduce a new mode of plant operation, and the replacement control rods are, by design, fully interchangeable with the original control rods. The power shaping and reactivity control functions of the Duralife 215 are comparable to the original control rods, and the mechanical strength and corrosion resistance of the Duralife 215 are superior to the original control blades. Taken together, these factors indicate that control rod replacement does not create the possibility of any accident that has not been previously evaluated.

3) Control rod replacement does not involve a significant reduction in any margin of safety because the Duralife 215 has been shown to be equivalent, and in some respects better, than the original control rods. The Duralife 215 has comparable reactivity worth when compared to the original control rods. The hafnium in the high flux region of the Duralife 215 provides maximum benefit to increasing the nuclear lifetime. GE has conducted scram speed tests and uses an analytical model which can simulate any core and control rod drive arrangement. Comparing scram speeds between the Duralife 215 and the original control rod design show slight changes. The GE analysis has shown that the scram speeds are not sufficiently different to impact the transient and accident analyses for WNP-2 because differences are within the error bounds assumed in the analyses. The structural strength and corrosion resistance of the Duralife 215 are greater than the original control rods, as such the Duralife 215 has increased resistance to distortion and fatigue. Reduced distortion or fatigue experienced by a control rod

corresponds to a reduced likelihood that control rod will be involved in a control rod drop accident or become stuck. Hence the replacement of original control rods with the Duralife 215 does not represent a significant reduction in any margin of safety in the licensing basis.

As discussed above, the Supply System has concluded that this change does not create a significant hazard, it does not create the potential for a significant change in the types or quantities of any effluent which might be released offsite, nor does it create the potential for increases in individual or cumulative occupational radiation exposure. The proposed change, therefore, meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and an environmental assessment of this change is not required, per 10 CFR 51.22(b).

This Technical Specification change request has been reviewed and approved by the WNP-2 Plant Operations Committee and the Supply System Corporate Nuclear Safety Review Board. In accordance with 10 CFR 50.91, the State of Washington has been provided with a copy of this letter.

Installation of the Duralife 215 control rods is scheduled to occur during the spring 1993 refueling outage; the remaining original control rods will be replaced in subsequent outages as needed. The outage is planned to last 45 days beginning in April. Core restoration is scheduled to begin on May 5th and is dependent on operable control rods therefore, prompt NRC approval of this submittal is much appreciated.

Sincerely,

GC Sorensen

G. C. Sorensen, Manager
Regulatory Programs (Mail Drop PE20)

JDF/bk
Attachments

cc: W Bishop - EFSEC
JB Martin - NRC RV
NS Reynolds - Winston & Strawn
JW Clifford - NRC
DL Williams - BPA/399
NRC Site Inspector - 901A

STATE OF WASHINGTON)
)
COUNTY OF BENTON)

Subject: Request for Amend to TS
Control Rod Assemblies

I. G. C. SORENSEN, being duly sworn, subscribe to and say that I am the Manager, Regulatory Programs for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.

Attached to this submittal is a copy of the following report which is considered by its respective owner to contain proprietary information:

- GE Duralife 215 Control Rod Safety Evaluation, GE Report GENE-778-028-0790 Revision 2, dated July 1992

Also attached is an affidavit executed by James F. Klapproth, Fuel Licensing Manager, General Electric Company, dated March 5, 1993, which provides the basis on which it is claimed that the subject report should be withheld from public disclosure under the provisions of 10 CFR 2.790.

The Washington Public Power Supply System treats the subject report as proprietary information on the basis of statements by its owner. In submitting this information to the NRC in support of the "WNP-2 Request for Amendment to Technical Specifications: Control Rod Assemblies," the Supply System requests that the subject report be withheld from public disclosure in accordance with 10 CFR 2.790.

DATE 15 MARCH, 1993

G. C. Sorensen, Manager
Regulatory Programs

On this date personally appeared before me G. C. SORENSEN, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

GIVEN under my hand and seal this 15th day of March 1993.

Notary Public in and for the
STATE OF WASHINGTON

Residing at Kennewick, Washington
My Commission Expires April 28, 1994