ATTACHMENT A

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 106

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Table 3.9-1

BEAVER VALLEY FUEL ASSEMBLY MINIMUM VS. INITIAL U_{235} ENRICHMENT FOR STORAGE IN REGION 2 SPENT FUEL RACKS

Initial U_{235} Enrichment	Assembly Discharge Burnup (GWD/MTU)
3.6	0
4.0	2.6
4.4	5.3
4.85	8.2

NOTE 1: Linear interpolation yields conservative results.

NOTE 2: The maximum burnup in the peak fuel rod should not exceed ~~60 GWD/MTU. See the safety evaluation associated with Amendment No. 12 for details.~~ the NRC approved limit for WCAP-12610.

(Proposed Wording)

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained for maximum internal pressure of 45 psig and a temperature of 280.0°F.

PENETRATIONS

5.2.3 Penetrations through the reactor containment building are designed and shall be maintained in accordance with the original design provisions contained in Section 6.2.4 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor shall contain 157 fuel assemblies (or ZIRLO). 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. 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 fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

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 to the applicable Surveillance Requirements,

ATTACHMENT B

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 106
REVISE DESIGN FEATURE 5.3.1 TO ALLOW USE OF ZIRLO

A. DESCRIPTION OF AMENDMENT REQUEST

The proposed amendment would revise Design Feature 5.3.1, Fuel Assemblies, to allow use of ZIRLO as an alternate zirconium based fuel rod material and remove the word clad since it has been eliminated from the text of the improved Standard Technical Specifications (NUREG-1431). Limited substitution of fuel rods by ZIRLO filler rods would also be permitted.

B. BACKGROUND

Design Feature 5.3.1 requires fuel rods to be constructed with zircaloy. Zirconium alloy or stainless steel filler rods may be substituted in place of fuel rods in accordance with approved applications of fuel rod configurations. The proposed amendment modifies Design Feature 5.3.1 to also allow fuel rods to be constructed with ZIRLO and allow fuel assembly reconstitution with ZIRLO filler rods.

C. JUSTIFICATION

The change is consistent with 10 CFR 50.44 and 10 CFR 50.46. The change is also consistent with NRC approved topical report, WCAP-13060, "Westinghouse Fuel Assembly Reconstitution Evaluation Methodology," which meets the intent of Supplement 1 of Generic Letter (GL) 90-02, "Alternative Requirements for Fuel Assemblies in the Design Features Section of Technical Specifications." NUREG-1431, "Standard Technical Specifications for Westinghouse Plants," specifically includes ZIRLO as an acceptable material when supported by a plant specific review.

Changing to ZIRLO is the first phase of a transition to higher burnup fuel. Future core designs may feature longer cycles, higher capacity factors, and ultimately, higher discharge burnups. Using higher discharge burnup fuel in the reactor core design reduces the number of fuel assemblies required per reload. This will save money by paying less for fuel fabrication and by using less spent fuel storage space. In order to support the required fuel enrichment and burnups, advanced alloys of zirconium must be used to maintain fuel integrity.

D. SAFETY ANALYSIS

In Federal Register Volume 57, Number 169, dated August 31, 1992, the NRC published amended regulations to reduce regulatory burden on nuclear licensees. The NRC revised the acceptance criteria in 10 CFR 50.44 and 10 CFR 50.46 relating to evaluations of emergency core cooling systems and combustible gas control applicable to Zircaloy fuel rods to include ZIRLO fuel rods.

ZIRLO is a preferred material since it provides a significant improvement in corrosion margin and fuel integrity. The NRC noted that the revision to include ZIRLO as an acceptable zirconium based material along with Zircaloy will reduce the licensee burden but will not reduce the protection of the public health or safety. The change eliminates the need to obtain exemptions in order to use fuel material not presently addressed in the regulations.

An analysis of the safety implications is provided in a NRC letter to Westinghouse dated July 1, 1991, titled "Acceptance for Referencing of Topical Report WCAP-12610, 'Vantage+ Fuel Assembly Reference Core Report' (TAC NO 77258)." This safety evaluation and a later one approved the use of the Vantage+ fuel design, i.e., ZIRLO clad fuel, described in WCAP-12610 and found it acceptable up to a fuel rod average burnup level of 60 GWD/MTU. Therefore, Note 2 applicable to Table 3.9-1 has been revised to limit the burnup in accordance with that approved by the NRC for WCAP-12610. The WCAP-12610 report supports the following conclusions:

1. The mechanical design bases and limits for the ZIRLO clad fuel assembly design are the same as those for the previously licensed Zircaloy-4 clad fuel assembly design, except those for clad corrosion.

2. The neutronic evaluations have shown that ZIRLO clad fuel nuclear design bases are satisfied and that key safety parameter limits are applicable. The nuclear design models and methods accurately describe the behavior of ZIRLO clad fuel.

3. The thermal and hydraulic design basis for the ZIRLO clad fuel is unchanged.

4. The methods and computer codes used in the analysis of the non-loss of coolant accident licensing basis events are valid for ZIRLO clad fuel, and all licensing basis criteria will be met.

5. The large break and small break loss of coolant accident (LOCA) evaluation models have been modified to reflect the behavior of the ZIRLO clad material during a LOCA. It is concluded that the revised evaluation model satisfies the intent of 10 CFR 50.46 and Appendix K of 10 CFR 50. There is no significant impact on typical large break and small break LOCA analyses results for the ZIRLO model revisions.

In addition, bounding LOCA rod heatup cases were evaluated and all acceptance criteria were met, including those in 10 CFR 50.46. Other LOCA-related accident analyses (Long Term Core Cooling, Hot Leg Switch Over, and hydraulic forces on the reactor vessel components) have been evaluated and are not

affected by the implementation of ZIRLO clad fuel. Adequate margin to the peak clad temperature limit of 2200°F is maintained.

The effect of ZIRLO on a locked rotor transient is minimal as documented in the Beaver Valley Unit 2 UFSAR Section 15.3.3. Sensitivity analyses performed by Westinghouse demonstrate that the impact on peak cladding temperature and metal-to-water reaction on the locked rotor transient results is insignificant.

The rod control cluster assembly (RCCA) ejection event (BV-2 UFSAR Section 15.4.8) was analyzed at hot full power and hot zero power. The analysis demonstrated that any consequential damage to the core or the reactor coolant system would not prevent long term core cooling and that offsite dose would remain within the guidelines of 10 CFR 100. WCAP-12610 includes results of sensitivity analyses performed by Westinghouse that demonstrate that the impact of ZIRLO on RCCA ejection event analyses results in an insignificant change in both the fraction of fuel melted at the hot spot as well as the peak fuel stored energy.

ZIRLO is an alloy of zirconium; therefore, the use of ZIRLO filler rods is addressed in Design Feature 5.3.1 as zirconium alloy. WCAP-13060 delineates the methodology used to evaluate applicable design criteria associated with reconstituted fuel assemblies that have solid filler rods replacing uranium filled fuel rods. Evaluations and analyses of fuel assembly reconstitution will be performed on a cycle specific basis whenever reconstituted fuel assemblies are used in the reactor core. The WCAP included proposed Technical Specification changes based on the conclusions in the WCAP and on the guidelines of GL 90-02.

Fuel configuration, size, enrichment and cladding material shall be limited to those designs that have been analyzed with applicable NRC-approved codes and methods, and shown by test or cycle specific reload analyses to comply with all fuel safety design bases. The use of ZIRLO fuel cladding or filler rods will be justified by a cycle specific reload analysis, in accordance with NRC approved applications of fuel rod configurations. The justification of the core analysis methods must address the effect on core-wide analyses of permissible core configurations with the reconstituted fuel.

The proposed change modifies Design Feature 5.3.1, Fuel Assemblies, to allow the use of the enhanced corrosion resistant fuel rod material ZIRLO and fuel assembly reconstitution with ZIRLO filler rods. This change is consistent with the Improved Standard Technical Specifications of NUREG-1431, the amended regulations, the NRC approved WCAP-12610 and is similar to changes incorporated by other plants (i.e., Byron and Braidwood, Amendments dated December 19, 1995). Table 3.9-1 Note 2 has been modified to limit the burnup in accordance with that approved by

the NRC for WCAP-12610. In addition, the required accident analyses have been evaluated and found acceptable; therefore, the proposed change is safe and provides an effective alternative to zircaloy.

Schedule Requirements

Unit 2 is planning to load fuel with ZIRLO cladding during the sixth refueling outage, currently scheduled to begin on August 30, 1996. Receipt of the new ZIRLO fuel rods is scheduled to start at the beginning of July. Therefore, it is respectfully requested that the NRC Staff review and approve this license amendment request no later than August 30, 1996, so that the amendment is in place prior to the loading of new fuel with ZIRLO into the reactor vessel.

E. NO SIGNIFICANT HAZARDS EVALUATION

The no significant hazard considerations involved with the proposed amendment have been evaluated, focusing on the three standards set forth in 10 CFR 50.92(c) as quoted below:

> The Commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards consideration, if operation of the facility in accordance with the proposed amendment would not:
>
> (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
>
> (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
>
> (3) Involve a significant reduction in a margin of safety.

The following evaluation is provided for the no significant hazards consideration standards.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The methodologies used in the accident analyses remain unchanged. The proposed changes do not change or alter the design assumptions for the systems or components used to mitigate the consequences of an accident. Use of ZIRLO fuel rod material does not adversely affect fuel performance or impact nuclear design methodology. Therefore, accident analysis results are not impacted.

The operating limits will not be changed and the analysis methods to demonstrate operation within the limits will remain in accordance with NRC approved methodologies. Other than the changes to the fuel assemblies, there are no physical changes to the plant associated with this technical specification change. A safety analysis will continue to be performed for each cycle to demonstrate compliance with all fuel safety design bases.

VANTAGE 5 fuel assemblies with ZIRLO fuel rods meet the same fuel assembly and fuel rod design bases as other VANTAGE 5 fuel assemblies. In addition, the 10 CFR 50.46 criteria are applied to the ZIRLO fuel rods. The use of these fuel assemblies will not result in a change to the reload design and safety analysis limits. Since the original design criteria are met, the ZIRLO fuel rods will not be an initiator for any new accident. The fuel rod material is similar in chemical composition and has similar physical and mechanical properties as Zircaloy-4. Thus, the fuel rod integrity is maintained and the structural integrity of the fuel assembly is not affected. ZIRLO improves corrosion performance and dimensional stability. No concerns have been identified with respect to the use of an assembly containing a combination of Zircaloy-4 and ZIRLO fuel rods.

The dose predictions in the safety analyses are not sensitive to the fuel rod material used; therefore, the radiological consequences of accidents previously evaluated in the safety analysis remain valid. A reload analysis is completed for each cycle, in accordance with NRC approved methodologies. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

VANTAGE 5 fuel assemblies with ZIRLO fuel rods satisfy the same design bases as those used for other VANTAGE 5 fuel assemblies. All design and performance criteria continue to be met and no new failure mechanisms have been identified. The ZIRLO fuel rod material offers improved corrosion resistance and structural integrity.

The proposed changes do not affect the design or operation of any system or component in the plant. The safety functions of the related structures, systems, or components are not changed in any manner, nor is the reliability of any structure, system, or component reduced. The changes do not affect the manner by which the facility is operated and do not change any facility design feature, structure, or system. No new or different type of equipment will be installed. Since there is no change to the facility or operating

procedures, and the safety functions and reliability of structures, systems, or components are not affected, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the change involve a significant reduction in a margin of safety?

The use of Zircaloy-4, ZIRLO, or stainless steel filler rods in fuel assemblies will not involve a significant reduction in the margin of safety because analyses using NRC approved methodology will be performed for each configuration to demonstrate continued operation within the limits that assure acceptable plant response to accidents and transients. These analyses will be performed using NRC approved methods that have been approved for application to the fuel configuration.

Use of ZIRLO as fuel rod material does not change the VANTAGE 5 reload design and safety analysis limits. The use of these fuel assemblies will take into consideration the normal core operating conditions allowed in the technical specifications. For each reload core, the fuel assemblies will be evaluated using NRC approved reload design methods, including consideration of the core physics analysis peaking factors and core average linear heat rate effects.

Based on the above, it is concluded that the proposed license amendment request does not result in a significant reduction in margin with respect to plant safety as defined in the UFSAR or any plant technical specification BASES.

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the considerations expressed above, it is concluded that the activities associated with this license amendment request satisfies the no significant hazards consideration standards of 10 CFR 50.92(c) and, accordingly, a no significant hazards consideration finding is justified.

G. UFSAR CHANGES

The UFSAR will be revised to include ZIRLO fuel rod material.