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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Cycle 12 Reload and Core Operating Limits Report

Beaver Valley Power Station, Unit No. 1 completed the eleventh cycle of operation on March 22, 1996, with a burnup of 12,871 MWD/MTU. This letter describes the Cycle 12 reload design, documents our review in accordance with 10 CFR 50.59 including our determination that no unreviewed safety question is involved, and provides a copy of the Core Operating Limits Report (COLR) in accordance with Technical Specification 6.9.1.12.

The new core configuration is arranged in a low leakage loading pattern and involves replacing nine (9) Region 1, twelve (12) Region 9B, eight (8) Region 11A, twelve (12) Region 11B, and forty (40) Region 12 fuel assemblies with twelve (12) fresh Region 13A fuel assemblies enriched to 3.6 weight percent, forty (40) fresh Region 14A fuel assemblies enriched to 3.6 weight percent, twelve (12) fresh Region 14B fuel assemblies enriched to 4.0 weight percent, nine (9) Region 1 fuel assemblies from Cycle 1, four (4) Region 10A fuel assemblies and four (4) Region 10B fuel assemblies from Cycle 9. In addition, one (1) Region 10A fuel assembly and three (3) Region 12 fuel assemblies have been reconstituted by replacing one (1) fuel rod in each assembly with a solid stainless steel rod. WCAP-13060-P-A, "Westinghouse Fuel Assembly Reconstitution Evaluation Methodology," provided the NRC approved codes and methods for evaluating the effects of the reconstituted fuel assemblies on the operation of the core in compliance with Technical Specification Design Feature 5.3.1.

The mechanical design of the new Region 14A and 14B fuel assemblies is similar to the previous reload fuel except for the following features:

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(1) To counter the relaxation of the springs from irradiation at higher burnup, the Region 14 bottom grid spring was modified to give a higher spring force at beginning of life. Evaluations were performed to determine the effects of modifying the bottom grid spring to provide a higher spring force. The modifications to the bottom grid spring have no adverse effect on the thermal hydraulic performance. The structural support of the fuel rod end is enhanced with the increased bottom grid spring forces. Therefore, the resistance of the fuel rod to crossflow excitations is improved. The ability of the grid to withstand externally applied loads has not changed. All bottom grid design criteria continue to be met. The extended burnup bottom grid spring force design does not compromise the performance of any safety-related system nor result in any adverse effect on any analysis, since this change does not affect the normal plant operating parameters, the safeguards systems actuation, or the assumptions and input parameters used in these analyses.

(2) The Region 14 fuel assemblies contain the cast composite bottom nozzle. This change represents a manufacturing process change. The composite bottom nozzle is a two-piece design incorporating a highly machined stainless steel adapter plate welded to a low cobalt investment casting. This casting replaces the previous eight-piece weldment comprised of four cast legs and four rolled skirt plates. Also a pitch change was introduced to provide for cold alignment of the thimble tube and thimble screwhole to improve part fit-up during nozzle removal/replacement. The composite bottom nozzle design is functionally interchangeable with the previous design. All bottom nozzle design criteria continue to be met.

(3) The Region 14 integral fuel burnable absorber (IFBA) rods will have a rod internal gas pressure increase from 100 to 200 psig. Peak clad temperature benefits are achieved from IFBA rods having a higher backfill pressure. The clad stress and rod internal pressure criterion are impacted by this change. These criteria have been evaluated for the core operating conditions. The evaluation demonstrates that the proposed change to 200 psig rod internal gas pressure satisfies the Westinghouse fuel design criteria.

In addition, four (4) Region 10A and eight (8) Region 12 fuel assemblies will utilize a damper rod assembly to reduce the potential for flow induced vibration of the VANTAGE 5H assembly. Each damper assembly consists of twenty-four (24) solid Zircaloy-4 damper rodlets attached to a holddown assembly. The damper rods are inserted into the fuel assembly guide thimbles and are designed to be used in fuel assemblies without rotated grids. The pertinent thermal-hydraulic and boiling criteria were evaluated and found to be acceptable. The use of vibration damping assemblies does not compromise the performance of any safety-related system nor result in any

adverse effect on any analysis, since this change does not affect the normal plant operating parameters, the safeguards systems actuation, or the assumptions and input parameters used in these analyses.

As in the previous cycle, eight (8) power suppression assemblies will be utilized in fuel assemblies located on the core periphery. The power suppression assemblies contain hafnium rodlets to reduce local neutron leakage near the reactor vessel wall.

These modifications meet fuel assembly and rod design criteria and will not adversely affect the core safety considerations. Fuel rod design evaluations for the new fuel were performed using NRC approved methodology to demonstrate that the fuel rod design bases are satisfied.

Duquesne Light Company has performed a review of this reload core design including a review of the core characteristics to determine those parameters affecting the postulated accidents described in the Updated Final Safety Analysis Report (UFSAR). The consequences of those accidents described in the UFSAR which could potentially be affected by the reload core characteristics were evaluated in accordance with the NRC approved methodology described in WCAP-9272-P-A "Westinghouse Reload Safety Evaluation Methodology." The effect of the reload design was either accommodated within the conservatisms of the assumptions used in the current analysis design basis, or it was demonstrated through evaluation that the reload parameters would not change the conclusions in the UFSAR.

No technical specification changes are required as a result of this reload design.

The NRC approved dropped rod methodology (WCAP-10298-A [non-proprietary], June 1983) was used for this design evaluation and confirmed that the peaking factors did not exceed the safety analyses limits.

The reload core design will be verified by performing the standard Westinghouse reload core physics startup tests. The results of the following startup tests will be submitted in accordance with Technical Specification 6.9.1.3:

1. Control rod drive tests and rod drop time measurements.
2. Critical boron concentration measurements.
3. Control rod bank worth measurements.
4. Moderator temperature coefficient measurements.

5. Startup power distribution measurements using the incore flux mapping system.

The COLR (enclosed) has been updated for this cycle to include new radial peaking factor at rated thermal power [F_{xy} (RTP)] limits for unrodded core planes. Figure 4 has been replaced with a new figure to address these new limits.

The Beaver Valley Onsite Safety Committee and the Duquesne Light Company Offsite Review Committee have reviewed the Reload Safety Evaluation and Core Operating Limits Report and determined that this reload design will not adversely affect the safety of the plant and does not involve an unreviewed safety question.

Sincerely,

Sushil C. Jain

Enclosure

c: Mr. L. W. Rossbach, Sr. Resident Inspector
Mr. T. T. Martin, NRC Region I Administrator
Mr. D. S. Brinkman, Sr. Project Manager