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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
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**Subject: Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
Cycle 5 Reload and Core Operating Limits Report**

Beaver Valley Power Station, Unit No. 2 completed the fourth cycle of operation on September 17, 1993, with a burnup of 16,826 MWD/MTU. This letter describes the Cycle 5 reload design, documents our review in accordance with 10 CFR 50.59 and our determination that no technical specification changes or unreviewed safety questions are involved, and provides a copy of the Core Operating Limits Report (COLR) in accordance with Technical Specification 6.9.1.14.

The new core configuration is arranged in a low leakage loading pattern and involves replacing twenty-four (24) Region 4B, twelve (12) Region 5A, twelve (12) Region 5B, and twenty-four (24) Region 5C fuel assemblies with forty-eight (48) Region 7A fuel assemblies enriched to 3.6 weight percent (w/o) and twenty (20) Region 7B fuel assemblies enriched to 4.0 w/o. A Region 2 fuel assembly discharged at the end of Cycle 1 will be reinserted to replace the center fuel assembly. Four Region 5B fuel assemblies discharged at the end of Cycle 3 have been reinserted. One of these assemblies has been reconstituted by replacing one fuel rod with a stainless steel rod. The reconstituted fuel assembly has been evaluated in accordance with the guidance described in NRC Generic Letter 90-02, Supplement 1. The mechanical design of the new fuel assemblies is similar to the previous reload fuel except for the following factors:

(1) To minimize the susceptibility of the fuel assembly to flow-induced vibration, the axial orientation of the mixing vane grids was modified such that the odd number grids with reference to the bottom (bottom grid is grid #1, second grid from the bottom is #2, etc.) were rotated 90 degrees in the clockwise direction. For the Region 7 fuel assemblies, this means that grids #3, #5 and #7 were rotated as described above. Since there are no physical changes to the grids or their axial positions, this change will have no effect on pressure drops, DNB performance, or other thermal-hydraulic criteria. All fuel assembly design criteria remain valid with no impact to the fuel.

(2) The design and manufacturing process for the top nozzle plates resulted in the creation of a cusp on the inside of the holddown spring slot. It was discovered that there was potential for the tang of the holddown spring to catch on the cusp in the fully compressed condition. Therefore, the cusp was removed to eliminate the potential for spring hangup. Concurrently, a change was made to the slot configuration to eliminate the keyhole in the slot. This improved the nozzle manufacturing process and eliminated any possibility of creating a cusp. The top nozzle holddown spring was modified to facilitate the assembly of the spring on the nozzle. All top nozzle and holddown spring design criteria continue to be met.

(3) Recent developments in the fuel rod and fuel assembly design have led to manufacturing all fuel assemblies with the fuel pellet stack at the same elevation relative to the bottom surface of the legs of the bottom nozzle. This led to a manufacturing change in the Region 7 fuel assemblies by standardizing the gap between the top of the bottom nozzle and the bottom of the fuel rod end plug at 0.465 inches. The fuel rod repositioning 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.

In addition, twelve Region 6A assemblies will utilize damper rods. The purpose of the damper rod assembly is to reduce the potential for flow induced vibration of the VANTAGE 5H assembly to acceptable levels when the fuel assemblies are located at the core periphery. 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. The damping devices are designed to be used in fuel assemblies without rotated grids that are placed adjacent to the core baffle. 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.

These modifications meet all fuel assembly/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 all of the fuel rod design bases are satisfied.

Duquesne Light Company has performed a detailed 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 incidents 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 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 (attached) has been updated for this cycle to include new F_{xy} (RTP) limits for unrodded core planes and Figure 4 has been replaced with a new figure to address these new limits.

The Beaver Valley Onsite Safety Committee (OSC) and the Duquesne Light Company Offsite Review Committee (ORC) 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,

J. D. Sieber

cc: Mr. L. W. Rossbach, Sr. Resident Inspector
Mr. T. T. Martin, NRC Region I Administrator
Mr. G. E. Edison, Project Manager