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ILLINOIS POWER

U-602651
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October 28, 1996

Docket No. 50-461

10CFR50.90

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Response to Questions on Clinton Power Station
Proposed Amendment of Facility Operating
License No. NPF-62 (NS-96-004)

Dear Madam or Sir:

By letter dated August 15, 1996, [Illinois Power (IP) letter U-602624], IP submitted an application for amendment of Facility Operating License No. NPF-62, Appendix A - Technical Specifications, for Clinton Power Station. The proposed amendment, currently under review by the NRC staff, consists of a change to the Technical Specifications to incorporate a revised Safety Limit Minimum Critical Power Ratio (SLMCPR) calculated by General Electric (GE) for CPS Cycle 7. The need to change the SLMCPR resulted from the 10CFR Part 21 condition reported by GE in their letter to the NRC dated May 24, 1996.

In support of the NRC review of the proposed amendment, IP was requested to respond to a number of questions. On October 15, 1996, IP participated in a conference call to discuss these questions and the associated responses. It was concluded that IP's responses adequately addressed the NRC concerns. However, as a followup to the conference call, IP was requested to provide a formal response to the questions. Accordingly, the attachment to this letter documents the requested IP responses.

As noted in the August 15, 1996 IP letter, the proposed amendment is required to support startup from the sixth (i.e., the current) refueling outage which began on

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October 13, 1996. As such, IP again respectfully requests review and approval of the subject amendment in a timeframe that supports that requirement.

Sincerely yours,

Paul J. Telthorst
Director-Licensing

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Attachment

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

On October 8, 1996 Illinois Power (IP) received a number of questions from the NRC reviewer for a proposed amendment to the CPS Technical Specifications to incorporate a revision of the Safety Limit Minimum Critical Power Ratio (SLMCPR) as calculated by General Electric (GE) for CPS Cycle 7. IP participated in a conference call on October 15, 1996 with the NRC to review the NRC's questions and discuss IP's responses. At the conclusion of that discussion, IP was asked to subsequently provide its responses to the questions in writing (on the docket) to support the NRC safety evaluation of the proposed change. The following therefore documents the questions and IP responses discussed in the October 15, 1996 conference call.

1. What type of GE fuel is being used (i.e., GE11, GE13, enrichments)? Can a breakdown of the Cycle 7 core be provided?

   The planned inventory of fuel bundles in the CPS core for Cycle 7 is as follows:

Number of Bundles	Bundle Type	Bundle Average Enrichment	Comments
68	GE8B	3.01 %	On core periphery only
156	GE10	3.22 %	
116	GE10	3.46 %	
104	GE10	3.48 %	
180	GE10	3.53 %	Fresh fuel bundles

   624 total bundles

2. Can further details be provided surrounding the differences between the generic and plant-specific evaluations? How many projected control blade patterns were considered?

   The CPS Cycle 7- specific SLMCPR was determined by GE using the analysis basis documented in GESTAR II with the following exceptions:

   - The CPS Cycle 7 Reference Loading Pattern, which was the basis for all Cycle 7 reload licensing analyses, was used for the cycle specific SLMCPR evaluation in lieu of the loading pattern used in the generic evaluation. Because of the large number of highly reactive, "once-burned" bundles (i.e., 220) carried over from Cycle 6 in addition to the relatively large number of fresh bundles (i.e., 180) to be loaded in Cycle 7, the radial power distribution will be relatively "flat" across the core. It is believed that this flat radial power distribution is the primary reason for the increase in the SLMCPR.

- The actual fuel bundle parameters (e.g., local power peaking factors) for all Cycle 7 fuel bundles were used in the analyses as opposed to generic bundle parameters.

- Instead of selecting only the exposure point corresponding to the peak hot excess reactivity, the full cycle exposure range planned for Cycle 7 was analyzed.

- The limiting control blade pattern was based on a control rod sequence planned for Cycle 7 but modified to maximize the number of fuel bundles at the Operating Limit MCPR (OLMCPR).

There was only one limiting control blade pattern used for this analysis; however, there were two different cases evaluated with this limiting rod pattern. The first case considered an exposure distribution consistent with expected accumulation for the nominal control blade patterns. The other case utilized the same limiting control blade pattern but with an exposure accumulation based on control blade patterns which increased the fraction of power that would be produced in the bottom of the core throughout the cycle.

3. How did GE/IP arrive at the most limiting rod pattern?

The SLMCPR was determined using a limiting control blade pattern which maximized the number of fuel bundles at, or near, the OLMCPR in accordance with the guidelines in the Technical Design Procedure for the GE Thermal Analysis Basis (GETAB) Safety Limit. The SLMCPR is insensitive to the particular control blade pattern used as long as the acceptance criteria defined in the GE procedure for the limiting rod pattern and resulting power distribution are met.

4. Your submittal states that the SLMCPR will increase by 0.02 for both single and dual loop operation. Facilities are submitting different delta-increases for SLMCPR. Please discuss how the 0.02 increase was determined.

Cycle-specific SLMCPR statistical analyses were performed for both single and dual loop operation using a Monte Carlo random perturbation method to simulate possible reactor operating conditions. Core-wide transients were simulated by increasing core thermal power above rated power. The analysis for single loop operation was performed in a manner similar to that for dual loop operation except that the uncertainties assumed for core total flow and traversing incore probe readings were larger. The CPS-specific GE analysis for single loop operation (see IP letter U-600679, dated October 7, 1986) is still valid except for references to a lower SLMCPR.

5. Is the Clinton Cycle 7 reload a mixed core with those other than GE11 fuel? Is any mixed core thermal-hydraulic effects considered in your cycle-specific analysis? Why does the generic GE11 SLMCPR still bound the Clinton Cycle 7 core?

The CPS Cycle 7 core will be composed entirely of GE10 fuel bundles except for the 68 GE8B bundles residing in low power locations on the periphery of the core. The central and peripheral orifice zones have different thermal-hydraulic characteristics, as do the GE8B and the GE10 fuel bundles. The most significant differences between the two bundle designs are that the GE10 bundles have a new channel design and new ferrule spacers. The "flow trippers" inside the expanded-diameter channel, together with the high performance spacers, improve critical power ratio margin and result in a slight change in core pressure drop. The thermal-hydraulic characteristics of both bundle types have been modeled explicitly in the cycle-specific analysis.

The generic GE11 SLMCPR of 1.07 was calculated in 1991 in accordance with the methodology defined in GESTAR II. The CPS SLMCPR for Cycle 7 is calculated to be 1.09 for dual recirculation loop operation, and 1.10 for single loop operation. These limits were calculated using the actual calculated rod power distributions for the GE8B and GE10 fuel bundles. Therefore, it has been determined that the generic GE11 SLMCPR is not bounding for the CPS Cycle 7 core and as a result it is necessary to revise the CPS Technical Specifications to reflect the new cycle-specific SLMCPR.