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Docket No. 50-461

10CFR50.90

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

Subject: Clinton Power Station Proposed Amendment of Facility Operating License No. NPF-62 (LS-95-013)

Dear Sir:

Pursuant to 10CFR50.90, Illinois Power (IP) hereby applies for amendment of Facility Operating License No. NPF-62, Appendix A - Technical Specifications, for Clinton Power Station (CPS). This request consists of a proposed change to Technical Specification 3.4.2, "Flow Control Valves (FCVs)," to delete the requirement to verify that the average rate of movement of each reactor recirculation system FCV is limited to less than or equal to 11% per second in the opening and the closing directions (Surveillance Requirement 3.4.2.2). This requirement was originally included in the Technical Specifications because it was an assumption of the transient analyses for recirculation loop control failures that resulted in both recirculation loop FCVs either opening or closing simultaneously. However, during the fifth refueling outage, the FCV control system was modified such that failure modes which could result in both FCVs opening or closing simultaneously were eliminated from the plant design. Thus, these transients (and therefore the associated surveillances) are no longer applicable to CPS.

A description of the proposed change and the associated justification (including a Basis For No Significant Hazards Consideration) are provided in Attachment 2. A marked-up copy of the affected pages from the current Technical Specifications is provided in Attachment 3. A marked-up copy of the affected pages from the current Technical Specification Bases is provided in Attachment 4. Further, an affidavit supporting the facts set forth in this letter and its attachments is provided in Attachment 1. Following NRC approval of this request, IP will revise the CPS Technical Specification Bases, in accordance with the Technical Specification Bases Control Program of Technical Specification 5.5.11, to incorporate the changes identified in Attachment 4.

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IP has reviewed the proposed change against the criteria of 10CFR51.22 for categorical exclusion from environmental impact considerations. The proposed change does not involve a significant hazards consideration, or significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, IP concludes that the proposed change meets the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

Sincerely yours,

J. G. Cook
Vice President

DAS/csm

Attachments

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

Attachment 1
to U-602499

J. G. Cook, being first duly sworn, deposes and says. That he is Vice President of Illinois Power; that the application for amendment of Facility Operating License NPF-62 has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said letter and the facts contained therein are true and correct.

Date: This 14 day of December 1995.

Signed: _____
J. G. Cook

STATE OF ILLINOIS) SS.
DeWitt COUNTY)

" OFFICIAL SEAL "
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/97

Subscribed and sworn to before me this 14th day of December 1995.

Jacqueline S. Matthias
(Notary Public)

Background

In response to an event described in Licensee Event Report (LER) 95-006 (reference Illinois Power (IP) letter U-602487 dated September 5, 1995), IP has reevaluated the Surveillance Requirements (SRs) associated with the reactor recirculation system flow control valves (FCVs) as specified in the Technical Specifications (TS) for the Clinton Power Station (CPS). LER 95-006 identified that, following maintenance on the FCV control components, appropriate testing had not been performed as required by the CPS TS. Because the maintenance was performed with the plant in power operation, post-maintenance verification of FCV rate of movement, as required by the TS, could not be performed without adversely affecting reactor power and thus, safe plant operation. In response to that event, the basis for this surveillance requirement was reviewed and IP determined that, due to a modification that was made during the fifth refueling outage, the rate of change limit is no longer applicable to the CPS design.

As described in CPS Updated Safety Analysis Report (USAR) Section 5.4.1 and the TS Bases for Limiting Condition for Operation (LCO) 3.4.1, "Recirculation Loops Operating," the reactor recirculation system is designed to provide a forced coolant flow through the reactor core to remove heat from the fuel. In addition, the reactor recirculation system is used to control reactivity over a wide span of reactor power by varying the recirculation flow rate to control the void content of the moderator. The reactor recirculation system consists of two recirculation pump loops external to the reactor vessel. These loops provide the piping path for the driving flow of water to the jet pumps within the reactor vessel. Each external loop contains a two-speed motor-driven recirculation pump, an FCV, and associated piping, jet pumps, valves, and instrumentation. Recirculation flow is controlled by pump speed (fast or slow) and FCV position. The recirculation loops are part of the reactor coolant pressure boundary and are located inside the drywell structure.

The original design of CPS allowed for three modes of automatic control and one mode of manual control of the recirculation loops. The two highest levels of automatic control modulated both FCVs together while the lowest level of automatic control and the manual control mode utilize individual controllers for each FCV. During the fifth refueling outage, this design was modified (via Modification RR030) such that flow in each loop can only be manually controlled by use of the individual FCV position controllers.

The CPS TS specify operability requirements for the recirculation loops and the FCVs. Specifically, LCO 3.4.1 requires either: (1) both recirculation loops to be in operation with matched flows and thermal power and total core flow to be within limits, or (2) one recirculation loop to be in operation with additional limitations on thermal power, core flow, core thermal operating limits, and Reactor Protection System (RPS) setpoints. LCO 3.4.2, "Flow Control Valves (FCVs)," requires the recirculation FCV in each operating recirculation loop to be operable. The SRs for LCO 3.4.2 further define the FCV

operability requirements. SR 3.4.2.1 requires each FCV to fail "as is" on a loss of hydraulic pressure at the hydraulic unit. SR 3.4.2.2 requires the average rate of FCV movement to be less than or equal to 11% of stroke per second in both the opening and closing directions. By this request, IP proposes to delete this limit on FCV stroke rate by deleting SR 3.4.2.2. A description and justification for the proposed change is provided below.

Description of Proposed Change

In accordance with 10 CFR 50.90, IP proposes to revise CPS TS 3.4.2, "Flow Control Valves (FCVs)," by deleting SR 3.4.2.2, thus no longer requiring periodic verification that the average rate of FCV movement is less than or equal to 11% of stroke per second for both opening and closing.

The proposed TS change is reflected on a marked-up copy of the affected pages from the CPS TS contained in Attachment 3. In addition, changes to the CPS TS Bases, consistent with the proposed TS changes, have been provided in Attachment 4.

Justification for Proposed Change

As stated above, SR 3.4.2.1 requires that each FCV fail "as is" on a loss of hydraulic pressure at the hydraulic unit. The basis for this SR, as described in USAR Section 6.3.3.7.2, is that the design-basis loss of coolant accident (LOCA) analysis assumes the initial core flow coastdown is governed by the coastdown of the intact recirculation loop. This coastdown is dictated by the coastdown of the recirculation pump, assuming that the FCV position does not change. Closure of the FCV will decrease the coastdown core flow, resulting in higher peak cladding temperatures. Opening of the FCV would result in greater coastdown core flow and thus, lower peak cladding temperatures.

The design of the FCV control system assures that the FCV fails "as is" in the event of a LOCA by a number of methods. As described in USAR Section 5.4.1.9, the electronic circuits of the electrohydraulic servo FCV positioning system incorporate interlock circuits that will inhibit motion of the FCV on a high drywell pressure condition. This action results in generating a zero-demand signal to the FCV servo and isolates the hydraulic fluid to the actuator via the pilot-operated isolation valves [one for each hydraulic power unit (HPU) subloop (each FCV has two HPU subloops)] and the pilot-operated check valves (two for each FCV actuator). SR 3.4.2.1 requires verification of the fail "as is" feature of each FCV at least once per 18 months. The change proposed in this request does not alter this requirement for the FCVs.

SR 3.4.2.2 requires the average rate of FCV movement to be less than or equal to 11% of stroke per second in both the opening and closing directions. This limit is controlled by an electronic limiter on the electrical demand signal sent to the FCV actuator. The stroke rate of the FCV is an initial assumption of the Recirculation Flow Controller Failure transients described in USAR Sections 15.3.2 and 15.4.5. The impact of deleting this stroke-rate testing requirement on each of these transient analyses is addressed separately below.

USAR Section 15.3.2 describes the Recirculation Flow Controller Failure - Decreasing Flow transient. Two separate scenarios were originally evaluated, one for fast closure of one FCV and one for fast closure of both FCVs. The consequences of these events are shown to be bounded by other transient events. The first event is assumed to occur as a result of a failure of an FCV's controller, resulting in that FCV stroking closed at a rate of 60% per second. This speed is the rate at which the FCV would close when limited solely by valve hydraulics. The second event originally evaluated assumed a failure of the master controller such that both FCVs were signaled to close. Since each FCV is further controlled/limited by an individual controller, the FCVs were assumed to close at a rate of 11% per second. (This was a valid assumption for the original FCV control system design since multiple failures involving the master controller as well as each FCV's controller would have to occur for both FCVs to close at the above 60% per second rate.) However, the control circuitry for the FCVs was modified via Modification RR030 during the fifth refueling outage, eliminating the capability to operate in a master controller mode. Each FCV must now be controlled individually.

Since each FCV is now individually controlled, the possibility that a single failure could affect operation of more than one FCV has been eliminated. As a result, fast closure of both FCVs is no longer postulated. Modification RR030 only affected the electronic control of the FCVs and did not affect the hydraulic limitations of the FCVs. Thus, the FCV stroke rate is still limited to less than 60% per second in the closing direction as assumed in the analysis for fast closure of one FCV.

USAR Section 15.4.5 describes evaluation of the Recirculation Flow Controller Failure - Increasing Flow transient. Two separate scenarios were originally evaluated, one for fast opening of one FCV and one for fast opening of both FCVs. The consequences of these events are shown to be bounded by other transient events. The first event is assumed to occur as a result of a failure of an FCV's controller, resulting in that FCV stroking open at a rate of 30% per second. This speed is the rate at which the FCV would open when limited solely by valve hydraulics. (As described in USAR Section 5.4.1.9, a velocity-limiting orifice is located in the "open" port of the FCV actuator which restricts hydraulic flow to and from the port. This orifice restricts FCV opening to less than 30% per second.) The second event originally evaluated assumed a failure of the master controller such that both FCVs were signaled to open. Since each FCV is further controlled/limited by an individual controller, the FCVs were assumed to open at a rate of 11% per second.

(This was a valid assumption for the original FCV control system design since multiple failures involving the master controller as well as each FCV's controller would have to occur for both FCVs to open at the above 30% per second rate.) However, as stated above, modification of the control circuitry per Modification RR030 during the fifth refueling outage eliminated the capability to operate in a master controller mode. Each FCV must now be controlled individually.

Since each FCV is now individually controlled, the possibility that a single failure could affect operation of more than one FCV has been eliminated. As a result, fast opening of both FCVs is no longer postulated. Modification RR030 only affected the electronic control of the FCVs and did not affect the hydraulic limitations of the FCVs. Thus, the FCV stroke rate is still limited to less than 30% per second in the opening direction as assumed in the analysis for fast opening of one FCV.

In addition to the above transient analyses, NRC requested IP during the initial licensing of CPS to evaluate the impact of an FCV closing at a realistic rate during a LOCA. IP responded to this request via the Licensing Review Group (LRG) - II which was established at that time to address licensing issues that were generic to the Boiling Water Reactor plants nearing receipt of an operating license. The LRG-II response was that, due to the remote possibility of an FCV closure during a LOCA, closure of an FCV during a LOCA should not be considered a design basis event. Notwithstanding, at the request of the NRC, the impact of an FCV closing at a rate of 11% per second during a LOCA was evaluated on a one-time basis. The results of that evaluation are documented in Section 6.3.2.3 of the NRC's Safety Evaluation for CPS (NUREG-0853). Although the FCV control circuitry has since been modified per Modification RR030, none of the original features that prevent closure of an FCV during a LOCA (i.e., control signal response and hydraulic isolation) were affected by Modification RR030. Thus, the basis for considering this event to be outside the design basis of the plant remains valid.

Based on modification of the FCV control circuitry under Modification RR030, failure modes that could result in signaling both FCVs to rapidly open or close are no longer credible. As a result, the transient analyses assuming FCV movement at a rate of 11% per second are no longer applicable to the CPS design. Requiring FCV stroke rate to meet this limit is overly restrictive and is inappropriate as a TS requirement. Further, testing to verify that FCV velocity is hydraulically limited to less than 30% per second in the opening direction and less than 60% per second in the closing direction introduces the potential to cause severe damage to the FCV or its actuator. The hydraulic limitation on FCV velocity was verified during initial plant startup as part of the Initial Startup Testing program. This testing found that the velocity of the FCVs varied from 21.7% per second to 23% per second in the opening direction and from 19.6% per second to 21.5% per second in the closing direction.

There are two passive hydraulic limitations on FCV opening and closing velocity. The first is the capacity of the hydraulic pumps and the second is an orifice in the "open" port of the FCV actuator. Calculations performed by IP have demonstrated that FCV opening and closing velocity is limited by pump capacity to less than 29.0% per second. This conclusion was also confirmed by General Electric (GE) (the supplier of the FCVs).

Although originally designed to limit FCV opening velocity, the velocity-limiting orifice limits FCV velocity in both the opening and closing directions. This is because, even in closing, the fluid being discharged from the "open" side of the FCV actuator piston must pass through it. Deterioration of the velocity-limiting orifice is not expected due to the extremely clean fluid passing through it, the very low flow rates during normal operation, and the size of the plate (0.25-inch thick stainless steel). In addition, and notwithstanding the calculations cited above, component testing performed on the HPU skids prior to installation demonstrated that, even with both HPU subloops pumping, the velocity orifice limited the opening and closing velocity of the FCVs to less than 30% per second.

The FCV actuators are also periodically rebuilt. The Acceptance Test Procedure requires verification that the FCV actuator will not stroke the FCV faster than 3.15 inches per second (equivalent to 30% per second) following rebuilding.

The combination of conservative analyses, component testing, and Initial Startup Testing described above provide confidence that the FCV velocity assumed in the transient analyses will not be exceeded over the life of the plant. (To repeat, the maximum opening and closing speed of each FCV is a physical limitation hydraulically constrained by the as-built design of the FCV controllers.) Thus, verification of rate of FCV movement in the opening and closing directions need not be performed by periodic testing and SR 3.4.2.2 can be deleted.

Basis for No Significant Hazards Determination

In accordance with 10 CFR 50.92, a proposed change to the Operating License (Technical Specifications) involves no significant hazards considerations if operation of the facility in accordance with the proposed change would not: (1) involve a significant increase in the probability or consequences of any 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. Illinois Power (IP) has evaluated this request against each of these criteria and determined that the request involves no significant hazards considerations. The basis for this conclusion is presented below.

(1) The Clinton Power Station (CPS) Updated Safety Analysis Report (USAR) evaluates three specific events related to operation of the reactor recirculation flow control valves (FCVs). The impact of the proposed change on each of these events is discussed below.

The loss of coolant accident (LOCA) analysis described in USAR Section 6.3.3.7.2 assumes that the FCVs fail "as is" in the event of a LOCA. This feature is assured by electronic interlocks in the FCV control circuitry and periodically verified as required by Technical Specification (TS) Surveillance Requirement (SR) 3.4.2.1. The design of these interlocks and the testing requirements are not affected by this proposed change.

The Recirculation Flow Controller Failure - Decreasing Flow transient analyses are described in USAR Section 15.3.2, and the Recirculation Flow Controller Failure - Increasing Flow transient analyses are described in USAR Section 15.4.5. Since the control circuitry for the FCVs has been modified such that the capability to operate in a master controller mode has been eliminated, each FCV is now individually controlled, and the possibility that a single failure could affect operation of more than one FCV has also been eliminated. As a result, fast closure and fast opening of both FCVs are no longer postulated for CPS. Thus, the surveillance (SR 3.4.2.2) associated with verifying that FCV movement is within the assumptions of the analyses for fast closure and fast opening of both FCVs can be deleted.

With respect to fast closure and fast opening of individual FCVs, the modification performed during the fifth refueling outage only affected the electronic master control of the FCVs and did not affect the hydraulic limitations of the FCVs. Conservative analyses, component testing, and the Initial Startup Test program provide confidence that individual FCV stroke rates assumed in the transient analyses will not be exceeded over the life of the plant. These analyses and conditions are sufficient to assure individual FCV stroke rates are adequately limited without the periodic performance of a specific test.

In addition to the above, the modification did not add any new failure modes to the design of the individual FCV controllers. In fact, failure modes associated with misoperation of the common master controller have been eliminated from the control circuit design. The modification did not alter any of the features associated with initiators of any LOCA or features which assure that the FCVs fail "as is" in the event of a LOCA.

Based on the above, IP has concluded that this request does not increase the probability or the consequences of any accident (or transient) previously evaluated.

(2) USAR Sections 15.3.2 and 15.4.5 describe the plant response to malfunctions of FCV control failures, and USAR Section 6.3.3.7.2 describes the assumptions made with respect to FCV failures and their impact on the LOCA analysis. The proposed change (and the associated modification prompting the proposed change) does not affect any other structures, systems, or components beyond the FCVs. All associated failure modes thus remain within the scope of the failure modes previously considered. As a result, IP has concluded that the proposed change cannot create the possibility of an accident not previously evaluated.

(3) This request does not involve any change to the requirements or design associated with initiation or mitigation of a LOCA. The consequences of transients associated with fast closure and fast opening of reactor recirculation system FCVs are bounded by the consequences of other transient events and thus are not utilized in establishing plant operating limits. Although the control circuitry for the FCVs was modified during the fifth refueling outage, that modification did not affect the hydraulic failure modes of the FCVs. Further, the modification did not add any new failure modes to the design of the individual FCV controllers. In fact, failure modes associated with misoperation of the common master controller have been eliminated from the control circuit design. As a result, assumed FCV operation during analyzed accidents and transients has not been altered. Conservative analysis, component testing, and the Initial Startup Testing program have confirmed that the FCV velocity assumed in the transient analyses will not be exceeded over the life of the plant. Thus, verification of rate of FCV movement in the opening and closing directions need not be performed by periodic testing and SR 3.4.2.2 can be deleted without resulting in a reduction in the margin of safety.

Based on the foregoing, IP concludes that this request involves no significant hazards considerations.