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10CFR50.12
10CFR50.90

Docket No. 50-461

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

Subject: Application for One-Time Exemption from 10CFR50 Appendix J and Technical Specification 3/4.6.1.2 for Containment Penetrations Associated with the Feedwater System at Clinton Power Station

Dear Sir:

In accordance with 10CFR50.12 and 10CFR50.90, Illinois Power (IP) hereby applies for a one-time exemption from 10CFR50 Appendix J and Clinton Power Station (CPS) Technical Specification 3/4.6.1.2 for the containment penetrations associated with the feedwater system. Per 10CFR50 Appendix J paragraph III.C.3 and Technical Specification 3.6.1.2, "Primary Containment Leakage," item b, the combined leakage rate for all containment penetrations and valves subject to Type B and C tests is limited to 0.60 La. Per Technical Specification 3.6.1.2, item d, the combined leakage rate for all secondary containment bypass leakage paths is limited to 0.08 La. With respect to these requirements, IP requests an exemption to exclude the leakage rates associated with two particular feedwater system containment isolation valves, 1B21-F032A and B, from these combined leakage rates for the third operating cycle only.

Each of the two feedwater lines at CPS incorporates three isolation valves. These isolation valves consist of a simple check valve [1B21-F010A(B)] inside the drywell, an air-assisted check valve [1B21-F032A(B)] just outside the primary containment and a remotely controlled, motor-operated gate valve [1B21-F065A(B)] further outside containment. Each of the valves noted above is listed on Technical Specification Table 3.6.4-1, "Containment Isolation Valves," and each is required to be Type C leak rate tested per Technical Specification Surveillance Requirement 4.6.1.2.d. The Type C leakage rate determined for any particular containment penetration (i.e., for the containment isolation valves

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associated with that penetration) is based on the "maximum pathway" leakage in which the valve with the smallest leakage rate is assumed to fail to close. To date, the maximum pathway leakage rate reported for each of the feedwater penetrations, in consideration of the three isolation valve arrangement, was based upon the leakage rate of the valve with the second smallest leakage rate in accordance with CPS Updated Safety Analysis Report (USAR) Table 6.2-47, note 24. As a result, the leakage rate of the worst of the three valves (i.e., 1B21-F032A and B) was excluded in the determination of the Type C leakage rate of these penetrations and therefore was also excluded from the combined leakage rates.

As a result of discussion with the NRC Staff on January 8, 1991, it was determined that the maximum pathway leakage of a feedwater penetration should be based upon the leakage rate of the check valve with the largest leakage rate. This is based upon not taking credit for valves 1B21-F065A and B as containment isolation barriers because they do not close in response to an automatic isolation signal.

The design of check valves 1B21-F032A and B (which utilizes a tilting disk and hard seat) makes it extremely difficult to achieve and maintain acceptable air leakage rates. IP has performed an extensive rework of these valves and the valves have successfully passed a 1000 pounds per square inch water leak rate test. However, IP has been unable to achieve acceptable air leakage results. (Individual leakage rates obtained for these valves after extensive rework during the current refueling outage exceeded the test instruments' range of 20,000 standard cubic centimeters per minute). IP believes that a more permanent and effective solution (which would likely involve changes to the current design) is required to obtain acceptable air leakage results and to ensure lasting performance of these valves. Approval of this request would provide IP adequate time to evaluate the various alternatives and adopt the best solution. The third refueling outage would provide the earliest opportunity to implement the best solution. Notwithstanding, IP has reviewed the applicable plant procedures and confirmed that they provide adequate direction to the operators to ensure that gate valves 1B21-F065A and B are closed in a timely manner when the feedwater system becomes unavailable. Further, operations personnel will be briefed to enhance their awareness of this concern and ensure compliance with the current procedural requirements.

In support of this exemption request, additional details and justification (including a Basis for No Significant Hazards Determination), and marked-up pages from the CPS Operating License and Technical Specifications are provided in Attachment 2. In addition, an affidavit supporting the facts set forth in this letter and its attachments is provided as Attachment 1.

IP has reviewed this request against the criteria of 10CFR51.22 for categorical exclusion from environmental impact considerations. This request does not involve a significant hazards consideration, or significantly increase the amounts or change the types of effluents that may be released offsite, nor would it significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, IP concludes that this request meets the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

Please note that approval of this request is required for startup from the second refueling outage which is currently scheduled to begin February 11, 1991. Therefore, this application is being requested to be reviewed on an exigent basis. Justification and a description of the exigent circumstances, including why the exigency could not be avoided, is provided in Attachment 2 to this letter. This request has been reviewed by the CPS Facility Review Group and Nuclear Review and Audit Group.

Sincerely yours,

J. S. Perry
Vice President

DAS/alh

Attachments

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

STATE OF ILLINOIS
COUNTY OF DEWITT

J. Stephen Perry, being first duly sworn, deposes and says: That he is Vice President of Illinois Power Company; that the application exemption from the requirements of 10CFR50 Appendix J and 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 application and the facts contained therein are true and correct.

DATE: This 18 day of January 1991

Signed: J. Stephen Perry

J. Stephen Perry

Subscribed and sworn to before me this 18 day of January 1991.

Sharon E. Harris

Notary Public

"OFFICIAL SEAL"
Sharon E. Harris
Notary Public, State of Illinois
My Commission Expires 3/9/91

Attachment 2

(Technical Specification Change Request No. LS-91-001)

Background and Description of Proposed Changes

In accordance with 10CFR50 Appendix J paragraph III.C.3 and Clinton Power Station (CPS) Technical Specification 3.6.1.2, "Primary Containment Leakage," item b, the combined leakage rate of all containment penetrations and valves subject to Type B and C tests shall be less than 0.60 La when pressurized to Pa [9.0 pounds per square inch guage (psig)]. In accordance with Technical Specification 3.6.1.2, item d, the combined leakage rate of all secondary containment bypass leakage paths shall be less than 0.08 La when pressurized to Pa. Accordingly, the leakage rates for feedwater system containment penetrations 1MC-009 and 1MC-010 are required to be included in these summations.

As identified in CPS Updated Safety Analysis Report (USAR) Section 6.2.4.3.2.1.1.1, the feedwater lines are part of the reactor coolant pressure boundary. The two feedwater lines each incorporate three isolation valves. The isolation valve inside the drywell is a simple check valve [1B21-F010A(B)] incorporating a soft seat and is located as close as practicable to the drywell wall. Outside the containment is an air-assisted check valve [1B21-F032A(B)] incorporating a hard seat and is located as close as practicable to the containment wall. Farther away from the containment is a remotely controlled motor-operated gate valve [1B21-F065A(B)]. In the event of a break in the feedwater line outside containment, the check valves would close to prevent any significant loss of reactor coolant inventory and thus provide prompt containment isolation. The 1B21-F032A(B) check valve is "power assisted" to close and receives an automatic closure signal from the protection (containment and reactor vessel isolation control) system. In the event of a loss-of-coolant accident (LOCA), it is important to maintain the availability of all reactor coolant makeup sources. For this reason, valve 1B21-F065A(B) is not designed to close in response to an automatic containment isolation signal. However, this valve may be remotely closed from the control room thus ensuring long-term containment isolation when the operator determines that continued makeup from the feedwater system is unnecessary. The NRC's acceptance of the design of the isolation provisions for the feedwater lines is specifically discussed in Section 6.2.4 of Supplement 2 to the NRC's Safety Evaluation Report for CPS (NUREG-0853).

As described in the cover letter of this submittal, CPS previously determined the maximum pathway leakage for each of these penetrations in accordance with Note 24 to CPS USAR Table 6.2-47 such that the leakage rate for each feedwater penetration was equal to the leakage rate of the valve with the second smallest leakage rate. This maximum pathway leakage was included in the combined leakage rate of containment penetrations and valves subject to Type B and C tests and in the combined leakage rate of secondary containment bypass leakage paths. Historically, the leakage rates of valves 1B21-F010A and B and 1B21-F065A and B have been much lower than that of valves 1B21-F032A and B. As a result, the maximum pathway leakage for these penetrations did not include leakage from valves 1B21-F032A and B.

Based on discussions with the NRC Staff on January 8, 1991, it was determined that the maximum pathway leakage for each of these penetrations must be based on the leakage rate of the check valve with the highest leakage rate (i.e., exclusive of the leakage rate associated with the remotely controlled, motor-operated gate valves 1B21-F065A and B). This position would require that the leakage rate through valves 1B21-F032A and B be used as the maximum pathway leakage for these penetrations and thus be included in the above combined leakage rates.

Including the leakage rates for the 1B21-F032A and B valves in the combined leakage rates would, at this time, cause the combined leakage rate of containment penetrations and valves subject to Type B and C tests to exceed the limits of 10CFR50 Appendix J and CPS Technical Specification 3.6.1.2. The combined leakage rate of secondary containment bypass leakage paths would also exceed the limits of Technical Specification 3.6.1.2. Therefore, IP is requesting a one-time exemption from 10CFR50 Appendix J and Technical Specification 3.6.1.2 to allow the air leakage rate of valves 1B21-F032A and B to be excluded from the above combined leakage rates for the third operating cycle.

In support of this request, marked-up pages from the CPS Operating License and Technical Specifications are included in this Attachment. (The indicated Operating License changes are only recommended changes as the primary intent would be to incorporate references to the 10CFR50 Appendix J exemption where appropriate.) Justification for this request, and an evaluation of its impact on the pertinent USAR analyses, is presented below.

Justification for Proposed Changes

The three transient/design basis accident analyses that are potentially impacted by this request consist of the feedwater line break outside containment event described in CPS USAR Section 15.6.6, the feedwater line break inside containment event described in CPS USAR Section 6.2.1.2, and the design basis accident recirculation line break described in CPS USAR Sections 6.2.1.1.3.3 and 15.6.5. Containment/system isolation provisions with respect to the feedwater lines are discussed below for each of these events.

I. Feedwater Line Break Outside Containment

As described in USAR Section 15.6.6, the feedwater line break for this event is assumed to be instantaneous, circumferential, and downstream of 1B21-F065A(B) relative to the containment. The two check valves in the feedwater line are assumed to terminate reactor coolant flow out of the break. Initiation of the emergency core cooling systems (ECCS) maintains the reactor water level above the low-low-low level 1 trip and eventually restores it to the normal elevation. As a result, the fuel is covered throughout the event and there are no pressure or temperature transients sufficient to cause fuel damage.

Testing of valves 1B21-F032A and B during the current refueling outage has demonstrated the ability of these valves to close under reverse water flow conditions. Additionally, these valves have successfully passed a 1000 psig water leakage test performed as required by Section XI of the ASME Code. Therefore, IP believes that the capability of these valves to check flow and function as reactor coolant pressure boundary isolation valves has been satisfactorily demonstrated.

Based on the above, both check valves [1B21-F010A(B) and 1B21-F032A(B)] in each of the feedwater lines would be available to check reactor coolant flow out of the break. This is consistent with the USAR analysis and provides isolation capability even in the event of a single failure. Since, the analysis demonstrates that no fuel damage occurs as a result of this event, any resultant offsite dose would be solely due to the amount of reactor coolant which is released from the break and would not be a function of containment leakage. Therefore, the air leakage of valves 1B21-F032A and B has no impact on the plant response or offsite dose consequences associated with this event.

II. Recirculation Line Break

As described in USAR Sections 6.2.1.1.3.3.1 and 15.6.5, the postulated instantaneous guillotine rupture of a reactor recirculation line produces the highest peak containment pressure and offsite dose consequences.

Prior to the postulated recirculation line break, the feedwater system would be in service providing the normal water supply to the reactor vessel. Following the postulated break, feedwater flow would continue as the steam driven feedwater pumps coast down. The steam supply for the steam driven feedwater pumps is provided from the main steam equalizing header which is downstream of the main steam isolation valves (MSIVs) relative to the containment. The MSIVs will receive an isolation signal as a result of the postulated recirculation line break, terminating the steam supply to the steam driven feedwater pumps. If the motor driven feedwater pump is in service prior to the postulated recirculation line break, then it would normally remain in service and aid the ECCS in restoring reactor vessel level. However, since the electrical supply to the motor driven feedwater pump is not safety-related, no credit for its operation was assumed for reactor vessel makeup. With the motor driven feedwater pump in service, the feedwater check valves would remain open and the feedwater flow would prevent the escape of containment atmosphere through the associated containment penetration.

In the event that continued makeup from the feedwater source is not required, the operator would secure the feedwater system and remotely close valves 1B21-F065A and B from the control room. IP has reviewed the applicable plant procedures and confirmed that they provide adequate direction to the operators to ensure that valves 1B21-F065A and B are closed in a timely manner when the feedwater system becomes unavailable. In

addition, operations shift personnel will be briefed to enhance their awareness of this concern and ensure compliance with the current procedural requirements.

With respect to containment air leakage through the feedwater penetrations, adequate short-term isolation would be effected by check valves 1B21-F010A and B when containment pressure is in excess of the pressure in the feedwater lines (i.e., when containment atmosphere leakage could occur). Each of these check valves has successfully passed Type C testing with air at a pressure of 9.0 psig (Pa). Closure of valves 1B21-F065A and B provides assurance of long-term containment isolation. Valves 1B21-F065A and B have also successfully passed Type C testing with air at 9.0 psig.

With respect to the concern for immediate or short-term containment isolation, IP also performed a realistic yet conservative evaluation of the potential for establishing a containment atmosphere leakage pathway to the environment through the feedwater containment penetrations. To support this evaluation, an analysis was performed to determine the maximum feedwater inventory depletion during reactor vessel blowdown. As it may be assumed that the feedwater system piping would be filled with water prior to the recirculation line break, this analysis demonstrated that only approximately 41% of the feedwater inventory that would be subject to the effects of the reactor vessel blowdown would be depleted primarily due to flashing.

With respect to the potential leakage pathway, any containment atmosphere leakage through the feedwater system containment penetrations would be confined to the feedwater system piping. Although the feedwater system piping is not specifically designed to withstand the effects of a seismic event, this piping is designed to the requirements of ANSI B31.1. Studies performed for the BWR Owners' Group MSIV Leakage Closure Committee, for example, have shown that piping designed to the requirements of ANSI B31.1 can reasonably be assumed to remain intact during a seismic event. The feedwater system piping contains a number of elevation changes between the main steam tunnel and the feedwater heaters so that the system therefore contains a number of water traps. In addition to these water traps, the feedwater becomes more subcooled, such that feedwater inventory depletion due to flashing is reduced, further into the feedwater delivery system. Following the reactor vessel blowdown and flashing of the water in the feedwater system, the remaining water in the feedwater system piping would be subjected to the post-LOCA containment pressure. The feedwater system piping elevation changes and components in the feedwater system will act to reduce the positive pressure seen by the water in the feedwater system piping. In addition, another check valve exists in the feedwater line at the discharge of the feedwater pump. These features ensure that a water seal would be maintained in the feedwater system piping for a considerable period of time, i.e., much longer than the period of time before operator action is taken to close valves 1B21-F065A and B. Therefore,

IP has concluded that, realistically, a pathway for the containment atmosphere to the main condenser (and then to the environment) would not be established.

III. Feedwater Line Break Inside Containment

As described in USAR Section 6.2.1.2, analysis of the feedwater line break inside containment was performed primarily to verify that containment subcompartments do not experience unacceptable pressure loadings. The feedwater line break was assumed to be an instantaneous guillotine rupture of the feedwater line in the annular space between the reactor pressure vessel and the biological shield wall. As described in USAR Section 6.2.1.2.1.2.2, the pressurization effects of the postulated feedwater line break inside containment are much less pronounced than for the reactor recirculation line break. As determined in the recirculation line break analysis above, there is sufficient water volume and piping elevation changes within the feedwater system to ensure that a water seal would remain in this line for a considerable period of time, even when the volume of water that would normally exist between the reactor vessel and the feedwater line break is excluded.

It should also be noted that the leakage rate testing requirements for the feedwater penetrations at CPS are unique with respect to the other BWR/6 plants. The containment isolation provisions for the feedwater lines of the other BWR/6 plants incorporate a leakage control system to provide long-term leakage control for these penetrations. Per 10CFR50 Appendix J, the leakage rates through containment penetrations which incorporate seal systems are not required to be included in the combined leakage rate of containment penetrations and valves subject to Type B and C tests. As a result, the other BWR/6 plants are not required to include the leakage rate of check valves 1B21-F010A(B) and 1B21-F032A(B) in the combined leakage rates. However, it should be noted that these leakage control systems are manually initiated after remotely closing valves 1B21-F065A and B. Therefore, these plants incorporate the same short-term containment isolation provisions as CPS.

Basis For No Significant Hazards Consideration

According to 10CFR50.92, a proposed change to the Operating License 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 the 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. This request is evaluated against each of these criteria below.

(1) As discussed above, containment isolation valves 1B21-F010A and B and 1B21-F065A and B have demonstrated acceptable air leakage rates. In addition, IP has determined that, on at least an interim basis, the design of the feedwater system piping provides adequate assurance that an air leakage pathway from the containment to the environment would not exist even in the

event of a failure to isolate these penetrations. Based on this determination, there is no impact on the applicable accident analyses presented in the USAR and this request will not result in a significant increase in offsite doses. In addition, this request does not involve a change to the plant design. Therefore, this request does not result in an increase in the probability of occurrence of any event previously evaluated.

(2) This request does not involve a change to the plant design. However, plant operation in accordance with the proposed exemption would constitute a change to operation relative to the testing requirements of 10CFR50 Appendix J. IP has determined that this change to operation has the potential to impact only the consequences of loss of coolant accident(s) which was previously discussed in Item 1 above. Leakage or failure of the 1B21-F032A and B check valves cannot alone create a new or different accident from any accident previously evaluated.

(3) As discussed above, this request only impacts the requirement to include the air leakage test results of check valves 1B21-F032A and B in the combined leakage rate of containment penetrations and valves subject to Type B and C tests, and in the combined leakage rate of secondary containment bypass leakage paths. Therefore, the only margin of safety that could be impacted by this request is the margin concerning the offsite dose consequences of a design basis LOCA and the associated regulatory offsite dose limits. The ability to maintain a water seal in the feedwater system piping outside containment together with the demonstrated acceptable air leakage rates of valves 1B21-F010A and B and 1B21-F065A and B provides adequate assurance, on at least an interim basis, that the capability to prevent containment atmosphere leakage to the environment during a design basis LOCA will be maintained. As a result, IP has concluded that this request does not introduce the possibility of a significant increase in offsite doses during a design basis accident. Therefore, this request does not result in a significant reduction in the margin of safety.

Based upon the foregoing, IP concludes that this request does not involve a significant hazards consideration.

Additional Information

In accordance with 10CFR50.12, granting an exemption from the requirements of 10CFR50 involves considering and balancing the factors listed in 10CFR50.12(b). In addition, these include (1) whether conduct of the proposed activities (in accordance with the proposed exemption) will give rise to a significant adverse impact on the environment and the nature and extent of such impact, if any; (2) whether redress of any adverse environment impact from conduct of the proposed activities can reasonably be effected should such redress be necessary; (3) whether conduct of the proposed activities would foreclose subsequent adoption of alternatives; and (4) the effect of delay in conducting such activities on the public interest, including the power needs to be used by the proposed facility, the availability

of alternative sources, if any, to meet those needs on a timely basis and delay costs to the applicant and to consumers.

Based upon the ability to maintain a water seal in the feedwater system piping outside containment, this request does not significantly change the type or amount of effluents that may be released offsite. In addition, there is no significant increase in individual or cumulative occupational radiation exposure. Therefore, IP concludes that this request will not give rise to a significant adverse impact on the environment.

Alternative solutions considered in lieu of this requested exemption all include modification of the current design. As identified in the cover letter of this request, the design of these check valves makes it extremely difficult to achieve and maintain acceptable air leakage rates. (These valves have successfully passed a 1000 psig water leak rate test.) Industry and CPS experience with tilting disk check valves has shown that this type of valve is not suitable for air leak tightness. IP has performed extensive rework of these valves during the current refueling outage. These rework activities have included valve disassembly, relapping the disks and seats, acceptable blue checking of the disks and seats, verification that bushing clearances are within design tolerances, and replacing the air operator solenoids. Despite this rework, IP has been unable to achieve acceptable air leakage results. IP believes that a more permanent and effective solution, which would likely involve changes to the current design, is required to ensure acceptable and lasting performance of these valves with respect to air leakage.

With respect to the effect of disapproving or delaying approval of this request, timely approval is required to permit CPS to resume operation in accordance with the current refueling outage schedule. Approval of this request would provide the time required for IP to evaluate the various alternatives and adopt the best solution. All of these alternatives require time to evaluate, and then, once a solution is identified, develop the design package(s), procure materials, and install. Denial of this request would likely result in a prolonged and costly extension of the current refueling outage with no significant benefit to safety.

As previously identified, IP is requesting that this application be reviewed on an exigent basis. The technical requirements for determining the maximum pathway leakage of penetrations are not specifically addressed in 10CFR50 Appendix J or the CPS Technical Specifications. Prior to discussion with the NRC Staff on January 8, 1991, IP believed that CPS was in full compliance with the requirements of 10CFR50 Appendix J and the CPS Technical Specifications with respect to the leakage requirements for the feedwater system containment penetrations. Therefore, the current exigent circumstances were unforeseeable. In consideration that this issue was identified near the completion of the current refueling outage and that its resolution requires adequate time to evaluate and adopt the best solution, prompt approval of the requested exemption to 10CFR50 Appendix J and proposed amendment to the CPS Technical Specifications is required to allow resumption of operation of CPS.