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U-603212
8E.100a

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Docket No. 50-461

10CFR50.90

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Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station Additional Information
Regarding Proposed Amendment of
Facility Operating License No. NPF-62 (LS-97-006)

Dear Madam or Sir:

By Illinois Power (IP) letter U-603032, dated October 23, 1998, (and as supplemented by IP letter U-603160, dated February 22, 1999) IP requested amendment of the Clinton Power Station (CPS) Operating License (License No. NPF-62) pursuant to 10CFR50.90. The application, which is currently under review by the NRC staff, consists of a proposed change to implement a feedwater leakage control system (FWLCS) mode of the residual heat removal (RHR) system. If approved, the amendment will change the periodic leakage testing requirement for the primary containment feedwater penetration isolation valves such that a water leakage test would be performed in lieu of the presently required air leakage test.

In support of the amendment request, a teleconference between the NRC staff and representatives from IP was held on March 15, 1999. During this teleconference the NRC staff requested additional information with respect to the time delay assumed in the radiological dose analysis for initiation of the high radiation mode of the main control room ventilation system due to single-failure considerations associated with that system. Attachment 2 of this letter contains the requested additional information.

Attachment 2 of this letter also provides an update/revision of the summary table of radiological effects associated with the subject license amendment, which was included in IP's request dated October 23, 1998, and as updated in IP's letter dated February 22, 1999. As explained in Attachment 2, this latest revision/update to the summary table of radiological effects has become necessary as a result of corrective action taken to address a documentation discrepancy (previously unrelated to the

requested changes to the CPS Operating License) wherein the actual net free volumes of the primary containment and drywell have been determined to be slightly smaller than the corresponding values used for these parameters in the original plant analyses. (This non-conforming condition is the subject of CPS Licensee Event Report 1999-006.) Operability of affected plant systems, structures, and components was resolved by performing bounding analyses to show that the impacts of the revised primary containment and drywell volumes are acceptable and that the primary containment and drywell will still operate within their design parameters during all analyzed events. A summary of this operability evaluation is included in Attachment 2.

The net free volume discrepancy issue impacts post-accident dose consequences because the reduced primary containment and drywell net free volume increases the calculated post-accident radionuclide concentration in the containment and drywell atmosphere thereby increasing the radiological dose consequences associated with leakage from the main steam isolation valves (MSIVs). Recent analyses have demonstrated that with the use of administrative controls the post-accident main control room and offsite doses remain within the current CPS licensing basis values. The calculated doses, however, without the use of administrative controls are slightly higher than those in the current CPS licensing basis and thus require review and approval by the NRC. Since the FWLCS amendment request also impacts the calculated post-accident doses, these two activities are being combined to promote an efficient and effective review process.

As noted previously, Attachment 2 contains a revision to the summary of radiological effects (Table 3) calculated for the associated FWLCS license amendment since the previous calculations performed in support of this amendment request did not include consideration of the reduced primary containment and drywell net free volumes. Consequently, the revised summary of radiological effects updates and supersedes the similar tables that were provided in IP's October 23, 1998, and February 22, 1999 letters.

Sincerely yours,

John P. McElwain
Chief Nuclear Officer

JFK/krk

Attachments

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

John P. McElwain, being first duly sworn, deposes and says: That he is Chief Nuclear Officer for Clinton Power Station; that this 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 24th day of June 1999.

Signed: John P. McElwain
John P. McElwain

STATE OF ILLINOIS) SS.
DeWitt COUNTY)

Subscribed and sworn to before me this 24th day of June 1999.

" OFFICIAL SEAL "
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/2001

Jacqueline S. Matthias
(Notary Public)

Response to Request for Additional Information

During a March 15, 1999 teleconference between the NRC staff and representatives from IP, the NRC staff requested additional information with respect to the time delay assumed for initiation of the high radiation mode of the main control room ventilation system as assumed to occur for restoring the VC system following postulated single failures.

As described in IP's February 22, 1999 letter (which provided additional information and supplemented IP's initial request dated October 23, 1998) corrective action was necessary to address a discrepancy between the design of the main control room ventilation (VC) system and the assumptions used in the original post-accident radiological dose analysis. Specifically, the calculation of the design basis accident (DBA) dose consequences to the main control room operators assumed that the VC system would be running and supplying filtered, pressurized air to the control room envelope immediately following and throughout the duration of the accident. However, a review of the VC system was performed and subsequently disclosed that for postulated single failures (e.g., loss of an emergency diesel generator, failure of a fan or a damper, etc.) manual operator action would be required to restore at least one train of the VC system in the high radiation mode of operation.

The radiological dose calculations performed in support of the FWLCS license amendment request were revised to resolve this discrepancy by including consideration of the most limiting single-active failures of the VC system. For dose analysis purposes, it was assumed (based on Standard Review Plan Section 6.4.III.3.d.3.ii) that the high radiation mode of VC operation is unavailable for the first 20 minutes of the accident. The analyses subsequently assumes that the control room HVAC air flows are returned to the design basis values 20 minutes after initiation of the accident. This 20-minute time delay includes time for the VC failure to be revealed (in response to an automatic accident signal), for operators to take action in response to the failure, and the time required for the system to achieve design conditions. This time delay is commensurate with delay times assumed for operator actions in other analyses and as recognized in the Standard Review Plan.

All of the postulated single active failures of the VC system were bounded by eight general cases. It was found that one case resulted in the most limiting thyroid dose, while a different case generated the most limiting γ-whole body and β-skin doses. Thus, the most limiting doses from both of these cases are entered in the summary table of radiological effects (Table 3). The main control room data used for calculating the doses associated with the two most-limiting single failure cases for the first 20 minutes after the postulated accident are shown in Table 1. Table 1 also includes a column of data used to calculate the doses after the first 20 minutes.

Reduced Primary Containment and Drywell Net Free Volumes

As discussed in the cover letter, a discrepancy pertaining to the net free volume of the primary containment and drywell has recently been identified (LER 1999-006). Specifically, investigations have revealed that the actual primary containment and drywell net free volumes are smaller than the values that were used as input for the original plant analyses. The primary containment volume used in the original analyses was 1,550,800 cubic feet, while the actual value is approximately 1,512,300 cubic feet. Similarly, the drywell volume used in the original analyses was 246,500 cubic feet, while the actual volume is approximately 241,700 cubic feet. Collectively, this represents a volume reduction of about two and one-half percent.

These volume discrepancies have a potential impact on the evaluations of the primary containment and drywell responses during postulated accident conditions described in the CPS Updated Safety Analysis Report (USAR) Section 6.2.1, "Containment Functional Design," as well as other USAR sections. As a result, bounding analyses were performed to determine the impact of the smaller volumes on the accident analyses.

These bounding analyses, including consideration of the impact on various dynamic loads, determined that although there were several instances where specific calculated parameters (e.g., drywell pressure and drywell negative pressure) slightly exceeded the values currently listed in the USAR, all of the affected design parameters remained below their corresponding design limits. However, one of these design parameters (containment pressure due to a small break loss-of-coolant accident) required imposing an administrative compensatory action (reducing the allowable drywell bypass leakage area from 1.18 square feet to 1.0 square feet) in order to meet the primary containment pressure design limit (as described in LER 1999-006).

Additional investigations were performed to determine the impact on other supporting calculations created by this volume discrepancy. The only significant impact that was identified pertained to the post-accident radiological dose analyses. Since the post-accident radioactive source term (fission product inventory) is a constant value, the concentration of radioactivity in the containment atmosphere assumed in the dose analyses will increase due to the decrease in the primary containment and drywell volumes. This resulting higher concentration of radioactivity increases the post-accident doses that are affected by main steam isolation valve (MSIV) leakage. With no compensatory actions, calculations show that some of the analyzed doses increase slightly above their current licensing basis values as a result of the smaller primary containment and drywell volumes. To compensate for this increase, administrative controls were invoked to reduce the MSIV leakage limit through each main steam line from its Technical Specification Surveillance Requirement (TS SR 3.6.1.3.9) value of 28 standard cubic feet per hour (scfh) to 27 scfh. This is an acceptable approach since a review of the most recent test results showed that the total leak rate for the MSIVs is well below the new administrative limit (about 40 percent of the allowable total). With these administrative controls in place, all of the post-accident doses remain at or below their previously analyzed values.

Table 2 contains the revised data associated with the primary containment and drywell net free volume issue. These data were used to calculate the revised doses listed in the summary table of radiological effects (Table 3) associated with the subject license amendment request. After approval of this license amendment request (which will establish new licensing basis limits with respect to the DBA dose analysis), the MSIV administrative limit of 27 scfh will no longer be required and the leakage limit will be returned to the Technical Specification value of 28 scfh.

The proposed licensing basis doses listed in Table 3 are based on doses obtained from DBA analyses for the revised leakage pathways introduced by the FWLCS. The proposed dose values also reflect consideration of the most limiting single-active failure of the VC system and account for the actual net free volume of the primary containment and drywell. There are also several conservatisms taken in the analysis. For example, a 300 second drawdown time for the secondary containment envelope is assumed in the analysis in lieu of the licensing basis requirement of $\leq$ 188 seconds. An additional conservatism taken is that the calculated doses were increased by approximately ten percent (rounding up to the next whole rem for the thyroid and β-skin doses, and rounding up to the next one half rem for the γ-whole body doses). The conservatisms used in the analyses supporting this license amendment, including the approximate ten-percent margin, are not a requirement for radiological analysis. Rather, they are included in this license amendment request to bound such considerations as instrument uncertainties, and provide operational margin for use in any subsequent minor radiological analyses that would not warrant the processing of a license amendment.

Operability Considerations

As noted previously (and in the cover letter), identification that the drywell and primary containment volumes are slightly smaller than what was previously assumed in the plant safety analyses constitutes identification of a nonconforming condition. With regard to determining operability for the affected systems, structures, and components, Generic Letter 91-18, Revision 1, "Information To Licensees Regarding NRC Inspection Manual Section On Resolution Of Degraded And Nonconforming Conditions, Change to Current Licensing Basis," dated October 8, 1997, includes the following discussion regarding changing the licensing basis to accept a nonconforming or degraded condition:

> [One] situation [to consider] is a final resolution in which the licensee proposes to change the current licensing basis to accept [an] as-found nonconforming condition. In this case, the 10 CFR 50.59 evaluation is of the change from the SAR-described condition to the existing condition in which the licensee plans to remain (i.e., the licensee will exit the corrective action process by revising its licensing basis to document acceptance of the condition). If the 10 CFR 50.59 evaluation concludes that a change to the TS or a USQ is involved, a license amendment must be requested, and the corrective action process is not complete until the approval is received, or other resolution occurs. In order to resolve the degraded or nonconforming condition without restoring the affected equipment to its original design, a licensee may need to obtain an exemption from 10 CFR Part 50 in accordance with 10 CFR 50.12, or relief from a design code in accordance with 10 CFR 50.55a. The use of 10 CFR 50.59, 50.12, or 50.55a in fulfillment of Appendix B corrective action requirements does not

relieve the licensee of the responsibility to determine the root cause, to examine other affected systems, or to report the original condition, as appropriate.

In both of these situations, the need to obtain NRC approval for a change (e.g., because it involves a USQ) does not affect the licensee's authority to operate the plant. The licensee may make mode changes, restart from outages, etc., provided that necessary equipment is operable and the degraded condition is not in conflict with the TS or the license. The basis for this position was previously discussed in Section 4.5.1.

Operability of plant systems, structures, and components affected by the containment net free volume issue was resolved by performing bounding analyses to show that the impacts of the revised primary containment and drywell volumes are acceptable and that the drywell and containment will still operate within their design parameters during all analyzed events. Similarly, a reanalysis of the dose consequences from a postulated design-basis loss-of-coolant accident was performed. This reanalysis included consideration of the smaller-than-previously analyzed primary containment and drywell net free volume. The results demonstrated that the doses received by the main control room operators were below the limits of General Design Criterion 19 of Appendix A to 10CFR50 and that offsite doses remain below the limits of 10CFR100.11. Thus, the primary containment and drywell were determined to be operable on the basis that they are performing per design, and the associated radiological consequences remain within the limits of the regulatory requirements.

Based on the above, Illinois Power has determined that the nonconforming/degraded condition is not in conflict with the Technical Specifications (TS) or the license. Since the TS are satisfied and required equipment is operable, and since IP is correcting the degraded or nonconforming condition in a timely manner (i.e., requesting NRC approval for the change via this amendment request), continued plant operation does not pose an undue risk to public health and safety.

Table 1
Control Room HVAC Data Used to Generate the Licensing Basis Doses

	Postulated Single Failure of the VC System Resulting in the Most Limiting **Thyroid** Dose	Postulated Single Failure of the VC System Resulting in the Most Limiting **γ-Whole Body** and **β-Skin** Doses	Nominal Base Value (applies after 20 minutes)
Main Control Room Free Volume (ft^3)	3.24E+05	3.24E+05	3.24E+05
Make-up Air Flow Rate (cfm)	0	3920	3300
Recirculation Air Flow Rate (cfm)	0	54900	54900
Make-up Air Filter Fractional Efficiency for Iodines	0.99 $^{\Psi}$	0.99 $^{\tau}$	0.99 $^{\varepsilon}$
Recirculation Air Filter Fractional Efficiency for Iodines	0.70 $^{\Psi}$	0.70	0.70
Unfiltered Inleakage Rates (cfm)	1510	10	10
Filtered Inleakage Rates (cfm)	0	650	650

Ψ = Since make-up and recirculation flows are zero for this case, the *effective* filter efficiency is also zero.

τ = For this case, the overall effective makeup air filter efficiency is equal to 0.9488 and is derived by the following relationship:

$$(1\text{-}EE) = [(1 - EM)(FM) + (1 - EFI)(FFI)] / (FM + FFI)$$

where: EE = effective filter efficiency
EM = design basis make-up filter efficiency (0.99)
EFI = design basis recirculation filter efficiency (0.70)
FM = makeup air flow rate (cfm)
FFI = filtered inleakage air flow rate (cfm)

ε = For this case, the overall effective makeup air filter efficiency is equal to 0.9423 and is also derived by the relationship given above.

Table 2
Primary Containment Data Used to Generate the Licensing Basis Doses

Leak Rate (%/day)	0.65
Containment Free Volume (ft^3)	1.512E+06
Drywell Free Volume (ft^3)	241,000
Projected Area Normal to Wind (m^3)	1460
MSIV Leak Rate (SCFH per line)	28
Suppression Pool Vent Area (ft^2)	420
Elemental Iodine Fraction	0.91
Particulate Iodine Fraction	0.05
Organic Iodine Fraction	0.04
SGTS Fractional efficiency for Iodines (after drawdown)	0.99
Suppression Pool Water Volume (ft^3)	146,400
Secondary Containment Bypass Fraction	8%
Drawdown Time (sec)	300 (1)

(1) 300 seconds was used for conservative analyses purposes. The CPS licensing basis drawdown time remains at ≤ 188 seconds.

Table 3
Summary of Radiological Effects (Rem)

30-Day MCR	Current CPS Licensing Basis Dose (as reflected in the USAR)	Effect of using POSTDBA, ICRP 30, [ϕ ε] and suppression pool scrubbing	FWLCS dose calculation results [ϕ ε]	Proposed new CPS Licensing Basis Dose [ϕ ε] (DBA-LOCA)	10CFR50 Appendix A GDC 19 Limit (SRP 6.4.II 6)
Thyroid	**4.3 (27)** [λ]	**4.934**	**21.87**	**25**	**30**
γ-Whole Body	**2.0**	**1.945** [δ]	**2.425** [δ]	**3.0** [δ]	**5**
β-Skin	**14.3**	**13.96**	**17.63**	**20**	**30**

2-Hour EAB	Current CPS Licensing Basis Dose (as reflected in the USAR)	Effect of using POSTDBA, ICRP 30, [ϕ] and suppression pool scrubbing	FWLCS dose calculation results [ϕ]	Proposed new CPS Licensing Basis Dose [ϕ] (DBA-LOCA)	10CFR100.11 Limit
Thyroid	**163**	**19.51**	**204.4**	**225**	**300**
γ-Whole Body	**4.4**	**3.742**	**9.948**	**11**	**25**

30-Day LPZ	Current CPS Licensing Basis Dose (as reflected in the USAR)	Effect of using POSTDBA, ICRP 30, [ϕ] and suppression pool scrubbing	FWLCS dose calculation results [ϕ]	Proposed new CPS Licensing Basis Dose [ϕ] (DBA-LOCA)	10CFR100.11 Limit
Thyroid	**156**	**18.14**	**77.56**	**86**	**300**
γ-Whole Body	**1.7**	**1.556**	**3.022**	**3.5**	**25**

[λ] The 27 rem value includes 650 cfm of filtered duct leakage. The 4.3 rem value does not include duct leakage.

[δ] For calculating MCR γ-whole body doses, Reg. Guide 1.109 dose conversion factors were used in conjunction with a finite cloud correction factor from Murphy-Campe. This value also includes dose received from external shine sources.

[ϕ] ICRP 30 dose conversion factors were used for thyroid doses. Reg. Guide 1.109 dose conversion factors were used for γ-whole body and β-skin doses.

[ε] MCR doses include consideration of the most limiting single failure of the main control room ventilation system. These doses also include 650 cfm of filtered duct leakage.