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 HAMPTON, J.W. Duke Power Co.
 RECIP. NAME RECIPIENT AFFILIATION
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SUBJECT: Discusses change in CCW sys, where valves previously closed
 are now open for 30 days while corrective actions are
 evaluated. Forwards 10CFR50.59 evaluation.

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DUKE POWER

April 14, 1993

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station, Units 1, 2 and 3
Docket Nos. 50-269, -270, -287
Condenser Cooling Water (CCW) System

This letter identifies a change in a previous commitment affecting the Condenser Cooling Water (CCW) System.

In a letter dated December 1, 1982 from Hal B. Tucker to James P. O'Reilly (attached), Duke Power stated that the CCW crossover valves had been closed to reduce the potential consequences of a turbine building flood situation. This was described as an interim action until the Standby Shutdown Facility (SSF) became operational. After the SSF became operational, these valves have been kept closed (except for maintenance and testing).

On April 9, 1993, CCW crossover valves, 1CCW-40 and 3CCW-42 were opened in response to the situation described in NRC Event No. 25378. This event involved the inability of the CCW system to supply adequate Net Positive Suction Head (NPSH) for the Low Pressure Service Water (LPSW) pumps after a postulated loss of coolant accident (LOCA) and a loss of off-site power (LOOP) coincident with a specific single-failure of electrical circuits that could cause all CCW pump discharge valves (on the affected unit) to close. The CCW crossover valves will be kept open for up to 30-days while alternatives for long-term corrective action are being evaluated.

This situation was discussed with NRC personnel (NRR and Region II) in a conference call on April 9, 1993. Attached is a copy of the safety evaluation, performed pursuant to 10 CFR 50.59, that addresses the opening of these valves.

The evaluation of long-term corrective actions will be completed by May 9, 1993, and the results will be communicated to the NRC.

Please call Ron Harris at (803) 885-3419 if there are any questions about this.

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ADD

U. S. Nuclear Regulatory Commission
April 14, 1993
Page 2

Very truly yours,

A handwritten signature in cursive script, appearing to read "J. W. Hampton for".

J. W. Hampton

REH/reh/ccw_nrc

attachments

cc: Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. S. D. Ebnetter
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW., Suite 2900
Atlanta, GA 30323

Mr. P. E. Harmon
Senior NRC Resident Inspector
Oconee Nuclear Station

6

DUKE POWER COMPANY

P.O. BOX 33189

CHARLOTTE, N.C. 28242

HAL B. TUCKER

VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4331

December 1, 1982

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Re: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Mr. O'Reilly:

As you are aware, a probabilistic risk assessment study is being done on Oconee Unit 3. The preliminary results of this study indicated that the turbine building flooding induced accident sequences are the most dominant sequences with respect to degraded core accidents. The study considered a range of potential flooding rates, their impact on important plant equipment, and actions necessary to terminate and/or to limit the consequences of the postulated flood.

It has been found that the turbine building drain, tripping the CCW pumps and closing the pump discharge valves, limiting the magnitude of possible backflow from the condenser discharge through the condensate coolers after terminating the flow from the CCW intake, and preventing flood water to enter the auxiliary building are important aspects of mitigating the postulated turbine building flooding events.

Although part of the design basis for the Standby Shutdown Facility (SSF) is turbine building flooding, the system is not presently operational. In light of this situation, and in an effort to reduce the impact of a major turbine building flood, interim actions were taken by Duke Power. The doors between the turbine and auxiliary building at the basement level were sealed shut. All other penetrations up to six feet above the floor level were also sealed shut. This will protect the HPI and LPI pumps in the auxiliary building from all but the most severe, and least likely, floods. The CCW crossover valves were closed such that only flow from any one unit would be available to feed a break. Also, using manual isolation valves, one condensate cooler on each unit was isolated to limit possible backflow.

These interim actions are providing an adequate level of safety and protection and will be reviewed and evaluated to determine if they (or other modifications) should be made permanent.

Very truly yours,

H. B. Tucker

Hal B. Tucker

JCP/php

8306060076

Duke Power Company

10 CFR 50.59 EVALUATION

- (1) Station: Oconee Unit(s): 1, 2, 3
- (2) Evaluation for: Opening Values 1CCW-40 and 3CCW-42
- (3) FSAR sections consulted: 3.4, 9.2.2, 15.0
- (4) Technical specifications consulted: none applicable
- Will technical specification changes be required? ☐ Yes ☒ No
- * Technical specifications affected: _____
- * Station Regulatory Compliance personnel contacted: _____

(5)

USQ EVALUATION APPLICABILITY

Does the modification involve a Structure, System, or Component (SSC) that is evaluated in the FSAR or a smaller SSC that is part of an SSC evaluated in the FSAR, and does the modification do more than replace components with equivalent components?

☒ Yes ☐ No

Will the modification degrade the effectiveness of an SSC important to safety in any design basis accident or event?

☐ Yes ☒ No

Does the modification appear to require inclusion in the FSAR due to the installation of a new system significant to plant operation, or installation of a significant addition to an existing system?

☐ Yes ☒ No

(6)

USQ EVALUATION

USQ EVALUATION NOT APPLICABLE ☐

May the modification:

Increase the probability of an accident evaluated in the SAR?

☐ Yes ☒ No

Increase the consequences of an accident evaluated in the SAR?

☐ Yes ☒ No

Create the possibility for an accident of a different type than any evaluated in the SAR?

☐ Yes ☒ No

Increase the probability of a malfunction of equipment important to safety evaluated in the SAR?

☐ Yes ☒ No

Increase the consequences of a malfunction of equipment important to safety evaluated in the SAR?

☐ Yes ☒ No

Create the possibility for a malfunction of a different type than any evaluated in the SAR?

☐ Yes ☒ No

Will the modification:

Reduce the margin of safety as defined in the basis for any technical specification?

☐ Yes ☒ No

PROVIDE AN ATTACHMENT TO SUBSTANTIATE ALL YES AND NO ANSWERS

Prepared by/date: KW Sander 4/9/93

Reviewed by/date: TA Sander 4-9-93

[illegible]

Purpose

The purpose of this calculation is to determine if opening Condenser Circulating Water (CCW) System valves 1CCW-40 and 3CCW-42 for a 30 day time period will create any unreviewed safety questions (USQs) using the criteria of 10 CFR 50.59, paragraph (a) (2). This calculation is QA Condition 1 because it determines the presence or absence of a USQ.

This calculation only evaluates the opening of valves 1CCW-40 and 3CCW-42. It does not address the concerns with Low Pressure Service Water (LPSW).

Background Information

A concern with water supply from the CCW System to the LPSW System exists if certain single failures occur. An operability evaluation was performed to address this concern. An operability evaluation determined that the Low Pressure Service Water (LPSW) System is conditionally operable. The condition of operability is that the position of valves 1CCW-40 and 3CCW-42 be changed from closed to open, and that this change is acceptable for a maximum period of 30 days (References 8 and 9).

Valves 1CCW-40 and 3CCW-42 are currently required to be isolated due to results of the Oconee Probabilistic Risk Assessment (Reference 4). The isolation of these valves is to minimize the flood volume and limit the number of valves that must be closed in the event of the failure of a CCW expansion joint (Reference 6). FSAR Section 3.4 addresses Turbine and Auxiliary flood protection measures in the event of a failure of the CCW expansion joints (Reference 1). The Units 2 and 3 Safety Evaluation Report also addresses flood control measures (Reference 10).

Safety Review

The CCW System provides for cooling of the condensers during normal and emergency operation of the plant. The system also serves as the ultimate heat sink for decay heat removal during cooldown of the plant (Reference 1).

Flood protection for the Auxiliary and Turbine Buildings is described in FSAR Section 3.4. This flood scenario is not addressed as a design basis accident (accident previously analyzed). It is a design event in which flood protection measures are incorporated into Oconee's design (References 1 and

5).

The potential for a Turbine Building flood is not increased if the CCW valves are opened. There is the same remote possibility that the CCW expansion joints will fail and flood the Turbine Building. With the CCW valves open, there are more valves that must be closed in the event of an expansion joint failure (or other isolatable CCW pipe failure). The increased potential for one of these valves to fail to close (10 valves currently per unit versus 30 valves after the proposed valve lineup change is made) was evaluated and determined to not be a significant increase in probability of malfunction of equipment important to safety during a 30 day time period. Reference 7 conservatively evaluates the incremental risk of core damage associated with the proposed valve changes and determined that it is less than $1E-06$ for a 30 day period. This additional risk is considered to be insignificant, and when added to the annual risk, it does not appreciable increase the core damage frequency (Reference 7).

Currently only the same unit's CCW pump discharge valves and the CCW condenser discharge valves must all be closed to isolate a leak to the maximum extent possible. If valves 1CCW-40 and 3CCW-42 are opened, then all three units' isolation valves will need to be closed. Assuming the leak has been isolated, there could be more water contained in the three units pipe to drain onto the Turbine Building floor, but the increased water is insignificant relative to the consequences of the existing flood analysis. Even with the increased amount of water in the CCW piping, the water level will not rise a significant amount in the Turbine Building to cause additional equipment important to safety to fail. The water will not flood the Auxiliary Building (Reference 7).

Reference 11 also concludes that the malfunction of valves 1CCW-40 and 3CCW-42 do not adversely impact the emergency CCW siphon (Reference 11).

USQ Evaluation

As a result of this modification:

- 1) May the probability of an accident previously evaluated in the SAR be increased?

No. The Turbine and Auxiliary Building floods are not design basis accidents. The potential for these flood events occurring is not increased due to the valves being

opened. The failure of the expansion joints is the same probability with the valves open or closed.

- 2) May the consequences of an accident previously evaluated in the SAR be increased?

No. The Turbine and Auxiliary Building floods will not be adversely affected by the valve position change. The Turbine and Auxiliary Building floods that can be isolated can still be isolated by closing CCW pump discharge valves and condenser discharge valves.

- 3) May the possibility of an accident which is different than any already evaluated in the SAR be created?

No. No accidents different than already evaluated in the SAR are postulated.

- 4) May the probability of a malfunction of equipment important to safety previously evaluated in the SAR be increased?

No. Opening of these CCW valves do not increase the potential for the CCW pipe or condenser expansion joint breaking, valve malfunctions, and flooding the Turbine or Auxiliary Buildings. The increased potential for one of the additional unit's CCW valves to fail to close (10 valves versus 30 valves) was evaluated and determined to not be a significant increase in probability of equipment important to safety failing during a 30 day period.

- 5) May the consequences of a malfunction of equipment important to safety previously evaluated in the SAR be increased?

No. When all three units are isolated, there will be more water contained in the three units pipe to drain onto the Turbine Building floor, but the increased water is insignificant to the consequences of the flood. With the increased amount of water in the CCW piping, the water level will not rise a significant amount in the Turbine Building to cause equipment important to safety to fail. The water will not flood the Auxiliary Building.

- 6) May the possibility of malfunctions of equipment important to safety different than any already evaluated in the SAR be created?

No. No new failure modes are postulated.

- 7) Will the margin of safety as defined in the bases to any Technical Specification be reduced?

No. This modification does not adversely affect any plant safety limits, set points, or design parameters.

Conclusions

Opening valves 1CCW-40 and 3CCW-42 for a 30 day time period does not involve USQs or safety concerns. No FSAR or technical specification changes are required.

This calculation only evaluates the opening of valves 1CCW-40 and 3CCW-42. It does not address the concerns with Low Pressure Service Water (LPSW).

References

- 1) Oconee Nuclear Station Final Safety Analysis Report (FSAR), 1991 Update, Sections 3.4, 9.2.2, 15.0.
- 2) Oconee Nuclear Station Technical Specifications, as amended to 1/27/93, no sections affected.
- 3) Oconee Nuclear Station Selected Licensee Commitments, as amended to 2/93, no sections affected.
- 4) Flow diagrams OFD-133A-1.1 (Revision 7), OFD-133A-3.1 (Revision 8)
- 5) OSS-0254.00-00-4005, "Design Basis Specification for Design Basis Events", Revision 1, Section 3.5.8.
- 6) OSS-0254.00-00-1003, "Design Basis Specification for the CCW System", Revision 1, Section 20.3.14.
- 7) PROFS note dated 4/9/93 from Lenny Azzarello to Tracy Saville (Attachment 1).
- 8) Problem Investigation Process No. 0-093-0312, originated 4/5/93.
- 9) Operability evaluation for PIP 0-093-0312, approved 4/9/93 (Attachment 2).
- 10) Units 2 and 3 Safety Evaluation Report dated July 6, 1973, Section 7.1.8.

OSC-6005

Sheet 5

By KWS Date 4/9/93

- 11) PROFS note dated 4/9/93 from Lenny Azzarello to Tracy Saville (Attachment 3).

From: LJA2713 --PRDC Date and time 04/09/93 13:32:18
To: TAS9821 --PRDC Tracy Saville
cc: JTH0007 --PRDC Tommy Holland BJD1371 --PRDC Bryan Dolan
 MEP6563 --PRDC Mark Patrick PMA8371 --PRDC P. M. Abraham

From: Lenny Azzarello (LJA2713)
Oconee Mech/Nuclear Eng
ONS Complex 885-4346
Subject: Effect of Opening CCW Cross-connect

I have reviewed the Oconee PRA to estimate the effect on core melt frequency of operating with CCW-40 and CCW-42 open.

Section 3.3 of the Oconee PRA estimates the annual core melt frequency from potential turbine building flooding. The logic given in figure 3.3-8 is used to calculate the initiating event frequency for floods of several sizes, both isolable and non-isolable. This logic, and therefore the probability of a turbine building flood occurring (initiating event frequency), is not affected by operating with CCW-40 and CCW-42 open.

The logic given in figure 3.3-10 of Section 3.3 determines the likelihood that a turbine building flood initiating event will lead to core melt. The probability of failure of equipment needed to mitigate the flood is modeled here. The current logic models the probability that the 4 CCW pump motor-operated discharge valves and the 6 air-operated condenser discharge valves fail to close. If any of these valves fail to close, what should have been an isolable flood becomes an unisolated flood. By opening the cross-connects, these valves on all 3 units must close (a total of 30 instead of 10) to insure isolation. If the flood is not isolated, the water level in the turbine building will rise and potentially submerge important equipment. The building water level and the resulting equipment affected is a function of the break size (flooding rate) versus the flow out the turbine building drain. There are several failures modeled in the logic other than just the valves themselves. It would therefore be conservative to multiply the probability of isolation failure by a factor of 3. This increased failure probability only applies to floods which would otherwise be isolable. Floods, which due to their location could not be isolable, would not be affected by the potential for additional valve failures. It would therefore, be additionally conservative to apply this factor of 3 increase to the entire turbine building flood core melt frequency.

The current core melt frequency due to turbine building floods is $5.5E-06$ per year. A factor of 3 increase results in a new frequency of approximately $1.6E-06$ per year. This is an increase of approximately $1E-05$ per year, if the crossconnect valves were to be left open for an entire year. If these valves were only left open for a period of 30 days, the increase in the annual core melt frequency would be less than $1E-06$. This increase is considered an insignificant increase in the total core melt frequency.

Given that isolation of the flood is successful, the additional water contained in the buried CCW piping of all 3 units (versus just 1 unit) will not cause an appreciable rise in the maximum water level reached in the turbine building. The 6-foot drain will carry this water away resulting in no additional consequences.

OCONEE ENGINEERING OPERABILITY EVALUATION

Station: Oconee Unit: 1,2,3 PIR Number: 0-093-0312
Structure, system, or component (SSC) in question: ECCW, LPSW

Design basis references applicable: FSAR Chapters 3, 9

Technical Specification sections applicable: 3.3.7 & 3.4.5

The SSC in question is recommended to be:

☐ OPERABLE ☒ **CONDITIONALLY OPERABLE** ☐ INOPERABLE
Operability Evaluation expiration date: 5/9/93

FSAR change required ☐ Yes ☒ No 10 CFR 50.59 Evaluation required ☒ Yes ☐ No

Summary/Comments: A single failure has been found which would result in all the CCW pump discharge valves for a single unit going closed following a LOCA/LOOP. This would isolate the primary suction flowpath for the LPSW pumps. It has been determined that the alternate suction flowpath, reverse flow through the condensate coolers and RCW coolers, would result in insufficient NPSH for the LPSW pumps during a LOCA/LOOP. In order to overcome the single failure vulnerability of LPSW suction, CCW cross-connect valves CCW-40 and CCW-42 shall be opened for no longer than 30 days. These valves had previously been closed to mitigate the effects of a turbine building flood, reducing the probability of the flood leading to core melt. During this 30 day period, long-term alternatives for eliminating the single failure vulnerability, will be evaluated. Calculation OSC-6006 documents that sufficient NPSH is available to the LPSW pumps when taking suction through the cross-connect from any unit's CCW intake. Furthermore, this calculation documents that operating for 30 days with these valves open results in an insignificant increase in the total annual core melt frequency.

Originated by: Leonard J. Amello Date: 4/9/93
Reviewed by: Thomas Helms E. J. Shaver Date: 4/9/93
Approved by: Ryan J. Holan Date: 4/9/93

From: LJA2713 --PRDC Date and time 04/09/93 15:27:56
To: TAS9821 --PRDC Tracy Saville
cc: JTH0007 --PRDC Tommy Holland BJD1371 --PRDC Bryan Dolan
MEP6563 --PRDC Mark Patrick KWS1379 --PRDC Kenneth W. Sandel

Opening CCW-40 and CCW-42 connects the CCW intake lines of the three CCW Systems. During ECCW, these systems would be operating in syphon mode. The cross connect is tied into these intake lines below the turbine building at an elevation of approximately 769 ft. This is the low point of each system. Any air inleakage on one unit's CCW System would rise to the high point of that system and would NOT travel through the cross connect to another unit's system.

Therefore, air inleakage on one unit's CCW System would not affect ECCW syphon flow on another unit, when CCW-40 and CCW-42 are open.