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U. S. Nuclear Regulatory Commission
Document Control Desk
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Perry Nuclear Power Plant
Docket No. 50-440
Technical Specification Charge Request:
Revisions to the Suppression Pool Makeup
Specification to Operate with a Reduced
Upper Containment Pool Water Level
Provided the Suppression Pool Water
Level is Raised to Compensate

Gentlemen:

Enclosed is a request for amendment of Facility Operating License NPF-58 for the Perry Nuclear Power Plant (PNPP) Unit 1.

This change involves Technical Specification 3.6.3.4, "Suppression Pool Makeup (SPMU) System," and allows continued operation with a reduced upper containment pool water level when the minimum required suppression pool water level is increased to compensate, thereby alloving for maintenance in portions of the upper containment pool. Changes to the Bases are included for your information, although not a formal part of the Technical Specifications as described in 10 CFR 50.36.

Attachment 1 provides the Summary, Safety Analysis Bases for the SPMU System, Description of the Changes, a listing of the Proposed Changes and the Significant Hazards and Environmental Considerations. Attachment 2 provides a copy of the marked-up Technical Specification and Bases pages.

If you have any questions, please feel free to call.

Sincerely,

200043

M. D. Lyster

Michael D. Lyster

MDL:RAL:ss

Attachments

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III
State of Ohio

Operating Companies
Cleveland Electric Illuminating
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A001
1/1

Summary

Technical Specification 3.6.3.4, "Suppression Pool Makeup System," specifies the conditions on the upper containment pool (UCP) water level in Operational Conditions 1, 2, and 3. The suppression pool makeup (SPMU) system provides water from the upper containment pool to the suppression pool (SP) by gravity flow through two 100% capacity dump lines following a LOCA. The suppression pool volume, between the normal low water level (LWL) and the minimum post-accident water level, plus the makeup volume added by the UCP following the UCP dump, is sufficient to account for all conceivable post-accident entrapment volumes, ensuring the long-term energy sink capabilities of the suppression pool and maintaining the two foot minimum water coverage over the uppermost horizontal vents. This capability is currently enforced by maintaining the water level within the suppression pool above the LWL (through Specification 3.6.3.1) and maintaining the upper containment pool above its minimum water level (through Specification 3.6.3.4). Alternatively, the same volume of water could be maintained by reducing the upper containment pool water level and raising the suppression pool level above the minimum water level to compensate. This is the primary change proposed by this Amendment Request. Additionally, the requirements for the upper containment pool gate positions have been clarified.

Safety Analysis Bases for the Suppression Pool Makeup System

The suppression pool makeup system is described in Section 6.2.7 of the PNPP Updated Safety Analysis Report (USAR) and in Technical Specification Bases 3.6.3.4. The purpose of the SPMU system is to maintain the operability of the suppression pool post-accident by providing additional water as needed. The SPMU system consists of two 100% subsystems, where each is capable of dumping the makeup volume from the upper containment pool to the suppression pool by gravity flow. The makeup volume is based on the determination of all possible places where water can be trapped after a LOCA and prevented from returning to the suppression pool. Following a LOCA the SPMU system is relied upon to dump the upper containment pool water to maintain horizontal vent coverage and an adequate suppression pool heat sink to ensure the primary containment internal pressure and temperature stays within design limits. Each dump line includes two normally closed valves in series. The upper containment pool is dumped on a low-low suppression pool level signal (with a LOCA permissive) to ensure the post-LOCA suppression pool requirements described below are met. In addition, the upper containment pool is also dumped on the basis of a timer to ensure that the makeup volume is available as part of the long-term energy sink for small breaks which might not cause a dump on suppression pool low-low water level. A dump initiation time of 30 minutes following a LOCA was chosen since the initial suppression pool mass is adequate for any sequence of vessel blowdown energy and decay heat out to at least 30 minutes.

For a LOCA, with ECCS injection from the suppression pool, a large amount of water can be held up in various entrapment volumes, such as; the volume in the drywell behind the drywell weir wall, the volume required to completely fill the reactor vessel from normal operating level to the top of the steam dome, the volume required to fill the steam lines out to the inboard MSIV for three lines and out to the outboard MSIV for one line, and a volume allowance for containment spray hold-up on equipment and structural surfaces. This holdup of water in these entrapment volumes can significantly lower the suppression

pool water level. The water transfer from the SPMU System ensures a post-LOCA suppression pool vent coverage of at least 2 feet above the top of the top row of horizontal vents to prevent direct steam bypass so that long-term steam condensation is maintained. The additional makeup water is also used as part of the long-term suppression pool heat sink. The SPMU system provides a means for storing and transferring water from the UCP through a post-LOCA delayed dump, thereby allowing the suppression pool water level to be maintained lower than would otherwise be the case, providing an initially low vent submergence which results in lower drywell pressure loadings and lower pool dynamic loadings during the blowdown phase of a LOCA as compared to a higher vent submergence.

The SPMU water volume required to be dumped to the suppression pool is normally established and controlled by: maintaining a minimum water volume above the inlets to the dump lines in the steam separator portion of the upper containment pool, the height of the weir wall between the reactor well and steam separator storage portions of the upper containment pool, and the gate positions between the various areas in the upper containment pool.

Description of the Changes

The upper containment pool water level is required to be maintained during Operational Conditions 1, 2, and 3 at a level of 22'-10" above the reactor pressure vessel (RPV) flange (which is also the elevation of the top of the fuel transfer tube pool wall), in accordance with the Suppression Pool Makeup System Specification (3/4.6.3.4). In order to provide for safe performance of maintenance within the fuel transfer tube pool portion of the upper containment pool during plant operation (e.g. for work on the inclined fuel transfer system (IFTS)), and for some other situations discussed below, several modifications are being proposed to the SPMU Specification. These modifications would fully maintain the existing safety function of the SPMU system, by compensating for a reduction in volume of water within the UCP with an equal increase in volume within the suppression pool.

In addition to the desireability of reducing the UCP level to enhance personnel safety for work within the fuel transfer tube pool, other situations were identified where the ability to operate with a reduced UCP level would be beneficial. For example, in the event that the fuel pool cooling and cleanup (FPCC) system could not maintain supply to the upper containment pool, the UCP level would eventually decrease to the level of the bottom of the skimmers (which is below the Technical Specification UCP limit of 22'-10"). If the UCP level could not be restored to at least the Technical Specification limit within four (4) hours (which is a very short duration to fix an inoperable pump or valve - if that was the problem), the plant would begin the shutdown process and be required to be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Since the function of the upper containment pool as part of the suppression pool makeup system is to provide a source of makeup water to the suppression pool, the minimum required suppression pool level (volume) could be increased to compensate for a corresponding reduction in the upper containment pool level (volume). An Action statement (and corresponding Surveillance Requirement) have been developed to control and implement this redistribution of UCP water. This redistribution of water meets the overall suppression pool

makeup system and suppression pool design bases.

Consequently, the addition of this new Action provides a significant improvement in plant safety as there is now an alternative to entering the shutdown process when the UCP is slightly below the normal Technical Specification limit. Avoiding a rapid forced shutdown reduces the chances of plant trips, inadvertent scrams or safety system actuations during this complex evolution and reduces the cycling of plant components.

A revised Action statement is proposed, which splits the existing Action 3.6.3.4.b into two sub-parts. Action 3.6.3.4.b.1 would maintain the present requirement to restore the water level in the upper containment pool to above 22'-10", if the level were to fall below that limit. If the UCP water level drops below this limit, and cannot be restored within the time required (and no compensatory action is taken as directed by new Action 3.6.3.4.b.2), it is still required that the plant be in the same shutdown conditions as for the existing Action (be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours). New Action 3.6.3.4.b.2 allows the upper containment pool water level to be reduced provided the requirements of Surveillance Requirement 4.6.3.4.a.1.b are met. Surveillance Requirement 4.6.3.4.a.1.b specifies that the UCP level may be reduced below the limit of 22'-10", to a level of 22'-5", as long as the suppression pool water level is raised 2.75 inches above the minimum suppression pool water level value determined in Limiting Condition for Operation (LCO) 3.6.3.1.a to compensate (pages from Specification 3/4.6.3.1 are included for information as part of Attachment 2). If this reduced UCP water level and increased suppression pool water level requirement cannot be met, the same shutdown conditions as currently exist (described above) are imposed. This new Action maintains the same "effective upper containment pool water volume" as the current design basis, the difference being that some of this "effective UCP water volume" has been relocated to the suppression pool as additional volume needed beyond that required to meet the minimum suppression pool LWL requirement of LCO 3.6.3.1.a. Therefore, there is no change in the overall volume available for long-term cooling and there would be no reduction in containment performance. Since the suppression pool high water level value is unchanged, there is no effect on the drywell pressure loading or pool dynamic loads during a LOCA due to the relocated water.

In order to assure that the required upper containment pool water level (volume) is available during times when the UCP level is reduced to below the normal minimum level, the suppression pool level (volume) is increased and Surveillance Requirement 4.6.3.4.a.1 has been split into two separate surveillances to ensure the two separate sets of requirements (those for normal UCP level and those for reduced UCP level with SP compensation) are maintained. Surveillance Requirement 4.6.3.4.a.1.a maintains the present requirement of verifying the water level in the upper containment pool to be 22'-10" above the reactor pressure vessel (RPV) flange. A new Surveillance Requirement 4.6.3.4.a.1.b has been added to allow the UCP water level to be reduced to a level of 22'-5" above the RPV flange provided that the minimum suppression pool water level is verified to be 2.75 inches higher than the level specified in LCO 3.6.3.1.a. These surveillance requirements ensure that the same "effective upper containment pool water volume" is always maintained.

The fuel transfer tube pool gate was formerly required to be installed in accordance with Surveillance Requirement 4.6.3.4.b.1, implying that it was needed to restrict the volume of water available to be dumped as part of a SPMU system actuation (i.e., isolating the fuel transfer tube pool from the rest of the upper containment pool). However, the effect of this slight increase in UCP dump volume on the SPMU system safety analysis had been previously evaluated and was found to be negligible, as described in the following paragraph. The Technical Specifications were not revised since this engineering evaluation was made late in the initial licensing phase, the Technical Specifications had already been submitted for NRC review, maintaining the minimum required UCP dump volume was the essential parameter for determining SPMU system operability, and with the gate installed sufficient UCP volume was available, consequently no Technical Specification changes were required. The Surveillance Requirement is now being revised since it is convenient to address this issue together with the other proposed changes to this Specification. This change clarifies that the fuel transfer tube pool gate is not required to be installed, but may be left in place, if desired, to allow for maintenance of equipment within the fuel transfer tube pool. With the gate installed the same amount of UCP water is available as was assumed in the current analysis. Also, with the gate left installed, and with the upper containment pool level lowered as described above, tests can be run to ensure that the inclined fuel transfer system is performing properly several months prior to entering a refueling outage. This provides time to effect repairs or order replacement parts prior to an outage. After completion of the IFTS checkout the fuel transfer tube pool gate could be removed in preparation for the upcoming refueling outage. With the fuel transfer tube pool gate removed additional water would then be available for an upper pool dump which enhances the suppression pool cooling capability. The effect of an inadvertent UCP dump on overflow into the drywell is minimal, as described below.

The slight increase in UCP volume from removing the fuel transfer tube pool gate, combined with the rare instance of the suppression pool being at its maximum permissible level, could result in a small increase in the amount of water that would overflow the drywell weir wall in the event of the unlikely occurrence of an upper containment pool dump during normal power operation. However, the minimum freeboard distance above the suppression pool high water level to the top of the drywell weir wall is adequate to preclude flooding of the drywell in most situations, and a LOCA permissive signal is used to prevent an erroneous suppression pool level signal from causing an upper pool dump. Also, as described within Sections 6.2.7.1.i and 6.2.7.3.3 of the USAR, the occurrence of a bounding overflow (up to ten feet of water in the drywell) has been previously analyzed, and this analysis has demonstrated that for the piping and components wetted in the event of a drywell flooding transient under worst case conditions, no safety concerns would result. This analysis was reviewed and agreed with by the NRC as documented in Section 10.1 of Appendix R to Supplement 8 of the Safety Evaluation Report for Perry (NUREG-0887). Therefore, removing the fuel transfer tube pool gate during Operational Conditions 1, 2, and 3, while slightly increasing the available volume of UCP water, does not present a safety concern regarding drywell flooding, and provides a positive benefit by providing additional water to increase the long-term energy absorption capabilities of the suppression pool following an upper containment pool dump.

Proposed Changes

Action 3.6.3.4.b (page 3/4 6-27)

Split the existing Action 3.6.3.4.b into two separate Actions, 3.6.3.4.b.1 and 3.6.3.4.b.2, to provide courses of action to take when the UCP is below the normal level, including either restoration of the normal level, or increase of the SP level to compensate for the reduced UCP level.

Surveillance Requirement 4.6.3.4.a.1 (page 3/4 6-27)

Split the existing Surveillance Requirement 4.6.3.4.a.1 into two separate Surveillance Requirements, 4.6.3.4.a.1.a and 4.6.3.4.a.1.b, to provide requirements to verify UCP level during normal operating conditions, and to verify both the UCP and SP levels when the UCP is below the normal level.

Surveillance Requirement 4.6.3.4.b.1 (page 3/4 6-27)

Revise Surveillance Requirement 4.6.3.4.b.1 to indicate that "all upper containment pool gates are removed (except the fuel transfer pool gate may be installed)."

Bases Change to Section 3/4.6.3 - Depressurization Systems (Page B 3/4 6-5)

Add a new paragraph as the last paragraph in this section describing how the SP level can be raised to compensate for a reduced UCP level.

Note: If this Technical Specification amendment request is processed after the changes proposed in letter PY-CEI/NRR-1510L are approved and issued, the value for the UCP water level will have been changed from 22'-10" to 22'-9". Within this letter, all references to 22'-10" should then be revised to read 22'-9". The reference to 2.75 inches as the suppression pool compensatory value within this letter, should also be changed from 2.75 to 2.20 inches. Within the Technical Specification page markups (see Attachment 2) Surveillance Requirement 4.6.3.4.a.1.a would then be revised to read 22'-9", and Surveillance Requirement 4.6.3.4.a.1.b would specify a suppression pool compensatory value of 2.20 inches. One inch less water would be assumed to be in the UCP in accordance with the containment response analysis presented in letter PY-CEI/NRR-1510L, but the "effective upper containment pool water volume" argument used throughout this letter would remain unchanged.

Significant Hazards Consideration

The standards used to arrive at a determination that a request for amendment involves no significant hazards considerations are included in the Commission's Regulations, 10 CFR 50.92, which state that the operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any previously evaluated, or (3) involve a significant reduction in a margin of safety.

The proposed amendment has been revieved with respect to these three factors and it has been determined that the proposed changes do not involve a significant hazard because:

1. The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The function of the upper containment pool (UCP) as part of the suppression pool makeup (SPMU) system is to provide a source of makeup water to the suppression pool (SP), subsequent to the occurrence of a LOCA, in order to maintain the required horizontal vent coverage and provide an adequate suppression pool heat sink to ensure the primary containment internal pressure and temperature stays within design limits.

   The proposed Action statement and Surveillance Requirement to permit reductions in the upper containment pool level, maintains the same "effective upper containment pool water volume" as the current design basis, the difference being that some of this "effective UCP water volume" has been relocated to the suppression pool as additional volume needed beyond that required to meet the minimum suppression pool low water level requirement of Limiting Condition for Operation 3.6.3.1.a. The probability of a LOCA occurring has not increased as a result of the proposed changes since the probability of a LOCA is unaffected by a relocation of the UCP water. The consequences of a LOCA are also not changed because under normal operating conditions the upper containment pool level is maintained within the required limits by the administrative controls imposed through the SPMU system Technical Specification Action and Surveillance Requirements. This change simply extends that approach by providing an additional Action and Surveillance Requirement to ensure that both the upper containment pool and suppression pool are maintained within their proposed respective limits (which ensure that the effective UCP water volume is maintained) when the upper containment pool is below its normal level. The proposed surveillance requirement ensures that the same "effective upper containment pool water volume" is always maintained. Therefore, there is no change in the overall water volume available as a heat sink for long-term cooling, no reduction in containment performance, and hence no change in consequences for any postulated LOCA.

   There is also no change in the probability of occurrence of an inadvertent SPMU system dump, since no change has been made to the system design or initiating circuitry. This change clarifies that the fuel transfer tube pool gate is not required to be installed, but that it may be left in place, if desired, to allow for maintenance of equipment within the fuel transfer tube pool. With the gate installed the same amount of UCP water is available as was assumed in the current inadvertent dump analysis, therefore there is no change in consequences. With the gate removed there would be a slight increase in the volume of water contained in the UCP which would be dumped in the event of an inadvertent upper containment pool dump. However, there is a very small likelihood of an inadvertent UCP dump due to the necessity to have a LOCA permissive signal in conjunction with a low-low suppression pool level signal or the completion of a 30-minute time delay. The total volume would only actually be increased if the dump were to occur when the suppression pool is at its high water level (with maximum differential pressure). Even if a UCP dump

were to occur, a bounding analysis (for up to ten feet of water in the drywell) for the drywell piping and components wetted in this event under worst case conditions has demonstrated that there would be no safety concerns. This analysis was reviewed and agreed with by the NRC as documented in Section 10.1 of Appendix R to Supplement 8 of the Safety Evaluation Report for Perry (NUREG-0887). Therefore, removing the fuel transfer tube pool gate during Operational Conditions 1, 2, and 3 does not impose a significant increase in consequences, regarding a drywell flooding transient, while it does provide a positive benefit in that extra water would be made available to provide for the long-term energy absorption within the suppression pool.

2. The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated because no design changes or new or different modes of operation are proposed for the plant. Operation under the proposed Action statement and Surveillance Requirement (determined to be acceptable on the basis discussed above) does not constitute a different mode of operation since adequate monitoring of both the suppression pool and upper containment pool levels is required by the Technical Specification Surveillance Requirements under both normal and reduced UCP water level conditions. The required upper containment pool gate positions are also controlled by Surveillance Requirements. The proposed Action statement and Surveillance Requirements on pool levels and gate positions ensure that the same (or greater) "effective upper containment pool volume" is available following an UCP dump, which is equivalent to the current design basis, therefore, the proposed changes do not create the possibility of a new or different accident from any previously evaluated.

3. The proposed changes do not involve a significant reduction in a margin of safety.

   The design basis of the suppression pool makeup system is to provide a makeup volume from the UCP following an UCP dump, that together with the suppression pool volume (between the normal low water level (LWL) and the minimum post-accident water level) is sufficient to account for all conceivable post-accident entrapment volumes, to ensure the long-term energy sink capabilities of the suppression pool and maintain the two foot minimum water coverage over the uppermost horizontal vents. This capability is currently enforced by maintaining the water level within the suppression pool above the LWL (through Specification 3.6.3.1) and maintaining the upper containment pool above its minimum water level (through Specification 3.6.3.4). Adding Action statements and Surveillance Requirements to provide an alternative way of maintaining the same volume of water between the upper containment pool and the suppression pool does not reduce, but rather maintains the same margins of safety, provided that both the suppression pool and the upper containment pool levels are properly controlled. The water level values chosen, and enforced through the new Action and Surveillance Requirement meet both sets of requirements and consequently do not reduce the margin of safety.

As described in the answer to question 1, a very unlikely set of circumstances has to occur to initiate an upper containment pool dump, and even if a dump were to occur, a bounding analysis for the drywell piping and components wetted in this event under worst case conditions has demonstrated that there would be no safety concerns. Therefore, removing the fuel transfer tube pool gate during Operational Conditions 1, 2, and 3 does not impose a significant reduction in the margin of safety, regarding a drywell flooding transient, while it does provide a positive benefit in that extra water would be made available to provide for the long-term energy absorption within the suppression pool (which would increase the margin of safety in this respect).

Environmental Consideration

The proposed Technical Specification change request was evaluated against the criteria of 10 CFR 51.22 for environmental considerations. As shown above, the proposed change does not involve a significant hazards consideration, nor does it increase the types and amounts of effluents that may be released offsite, nor does it significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, it has been concluded that the proposed Technical Specification change meets the criteria given in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.