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10 CFR 50.90

August 1, 2007

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Additional Information Supporting Request for a License Amendment to Technical Specification 3.7.3, "Ultimate Heat Sink," and Request for Processing on an Emergency Basis

Reference: Letter from D. M. Benyak (Exelon Generation Company, LLC) to U. S. NRC, "Request for a License Amendment to Technical Specification 3.7.3, 'Ultimate Heat Sink,'" dated June 29, 2007

In the referenced letter, Exelon Generation Company, LLC (EGC) requested a change to the Technical Specifications (TS) of Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. The proposed change increased the maximum allowed TS temperature limit, contained in TS Surveillance Requirement 3.7.3.1, of the cooling water supplied to the plant from the Core Standby Cooling System (CSCS) pond (i.e., the Ultimate Heat Sink (UHS)) from 100 °F to 101.5 °F. The proposed change was based on a reduction in instrument uncertainty resulting from the replacement of the originally installed thermocouples with precision resistance temperature devices.

The UHS consists of an excavated CSCS pond integral with the cooling lake, and the piping and valves connecting the UHS with the Residual Heat Removal Service Water System and Diesel Generator Cooling Water System. Prolonged hot weather in the area, in conjunction with high humidity during the daytime and minimal cooling at night, has resulted in sustained elevated cooling water temperature supplied to the plant from the CSCS pond. The lake level has been raised to the high end of the operating band, and make up and blow down have been optimized, in an attempt to limit the impact of the environmental conditions. However, despite these efforts, the LSCS UHS temperature projections currently indicate that the maximum allowed TS temperature limit of 100 °F will be exceeded during the evening hours of August 3, 2007.

Therefore, in accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (a)(5), EGC is requesting that further processing of the referenced license amendment request be completed on an emergency basis, since the failure to act in a timely way would result in shutdown of LSCS Units 1 and 2. Approval of the proposed license amendment is requested by August 3, 2007. An explanation of the emergency and why it could not be avoided is included in Attachment 1.

On August 1, 2007, EGC discussed with the NRC the circumstances related to the need for processing of the referenced license amendment request on an emergency basis. During these discussions, the NRC provided information regarding the current status of the review of the referenced license amendment request. Based on the NRC feedback, EGC agreed to provide a supplement to the referenced license amendment request to include a revised instrument uncertainty analysis that is based on a 1.645 standard deviation two-sigma for a one-sided (increasing) uncertainty. The revised instrument uncertainty analysis is more conservative than the original analysis and results in a proposed maximum allowed TS UHS temperature limit of 101.25 °F.

The Attachments to this letter, as shown below, contain updated information that reflects the revised instrument uncertainty analysis.

- Attachment 2 provides a revised evaluation of the proposed change that completely supersedes the evaluation included as Attachment 1 of the referenced letter. The revised evaluation includes revision bars that indicate the location of changes that have been made.
- Attachment 3 provides the revised instrument uncertainty analysis.
- Attachment 4 includes a revised markup TS page with the proposed change indicated.
- Attachment 5 includes the associated typed TS page with the proposed change incorporated.
- Attachment 6 includes the typed TS Bases pages with the proposed changed incorporated. The TS Bases pages are provided for information only, and do not require NRC approval.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Alison Mackellar at (630) 657-2817.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 1st day of August 2007.

Respectfully,

Patrick R. Simpson
Manager – Licensing

Attachments:
1. Basis for Requesting an Emergency License Amendment
2. Evaluation of Proposed Change
3. Calculation L-003230, "CW Inlet Temperature Uncertainty Analysis," Revision 001
4. Markup of Proposed Technical Specifications Page Change
5. Typed Page for Technical Specifications Change
6. Typed Pages for Technical Specifications Bases Page Changes

ATTACHMENT 1
Basis for Requesting an Emergency License Amendment

Explanation of Emergency Situation

10 CFR 50.91, "Notice for public comment; State consultation," paragraph (a)(5) states that where the NRC finds that an emergency situation exists, in that failure to act in a timely manner would result in derating or shutdown of a nuclear power plant, it may issue a license amendment involving no significant hazards consideration without prior notice and opportunity for a hearing or public comment. The regulation requires that a licensee requesting an emergency amendment explain why the emergency situation occurred and why the licensee could not avoid the situation.

The LaSalle County Station (LSCS), Units 1 and 2, Ultimate Heat Sink (UHS) consists of an excavated Core Standby Cooling System (CSCS) pond integral with the cooling lake, and the piping and valves connecting the UHS with the Residual Heat Removal Service Water System and Diesel Generator Cooling Water System. Prolonged hot weather in the area, in conjunction with high humidity during the daytime and minimal cooling at night, has resulted in sustained elevated cooling water temperature supplied to the plant from the CSCS pond. The lake level has been raised to the high end of the operating band, and make up and blow down have been optimized, in an attempt to limit the impact of the environmental conditions.

However, despite these efforts, the LSCS UHS thermal model temperature projections currently indicate that the maximum allowed Technical Specification temperature limit of 100 °F will be exceeded during the evening hours of August 3, 2007. This projection is based on a thermal model that, based on previous experience, is reliable. However, if conditions worsen, the UHS temperature limit may be reached earlier. Without approval of the proposed change, Technical Specification 3.7.3, "Ultimate Heat Sink (UHS)," would require both units to shutdown if the existing Technical Specification temperature limit of 100 °F is exceeded.

The forecasted UHS temperatures are the highest experienced in the station's history. Previously, the highest UHS temperature experienced was 99.8°F in August 2005. The forecasted UHS temperatures are a result of prolonged high ambient temperatures, coupled with a lack of winds.

Alternative options to mitigate the UHS temperature increase are limited. As stated above, the lake level has been raised to the high end of the operating band and make up and blow down have been optimized. Other actions to reduce lake temperature have been considered, but would not be effective.

In response to the above experience, Exelon Generation Company, LLC (EGC) submitted a license amendment request to increase the maximum allowed TS UHS temperature on March 13, 2006, that was subsequently denied by the NRC on November 3, 2006. Following public meetings with the NRC, a subsequent license amendment request was submitted on June 29, 2007, which incorporated additional information and detail based on insights from these meetings.

As discussed above, this emergency situation results from unforeseen prolonged adverse environmental conditions in the area. Under these conditions, EGC could not have reasonably applied for this emergency license amendment in advance of the event or in a more timely manner following the event.

In addition, as demonstrated in Section 5.1 of Attachment 2, the proposed change does not involve a significant hazards consideration.

Based on the above, the requirements for an emergency situation as stipulated in 10 CFR 50.91(a)(5) have been met.

ATTACHMENT 2
Evaluation of Proposed Change

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1.0 DESCRIPTION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) is requesting a change to the Technical Specifications (TS) of Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. Surveillance Requirement (SR) 3.7.3.1 verifies the cooling water temperature supplied to the plant from the Core Standby Cooling System (CSCS) pond (i.e., the Ultimate Heat Sink (UHS)) is ≤ 100°F. Currently, if the temperature of the cooling water supplied to the plant from the CSCS pond is > 100°F, the UHS must be declared inoperable in accordance with TS 3.7.3. TS 3.7.3 Required Action B.1 requires that both units be placed in Mode 3 within 12 hours, and Required Action B.2 requires that both units be placed in Mode 4 within 36 hours.

Prolonged hot weather in the area over the past few summers has resulted in sustained elevated cooling water temperature supplied to the plant from the CSCS pond. High temperatures and humidity during the daytime, in conjunction with minimal cooling at night and little precipitation, have resulted in elevated water temperatures in the LSCS UHS. Continued hot weather conditions in the future may result in the temperature of the CSCS cooling pond challenging the current TS limit of 100°F.

This license amendment is being sought to increase the TS temperature limit of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F, by reducing the temperature measurement uncertainty through the use of higher precision temperature measuring equipment. Should the UHS indicated temperature exceed 101.25°F, Required Action B.1 would be entered and both units would be placed in Mode 3 within 12 hours and Required Action B.2 would be entered requiring both units to be in Mode 4 within 36 hours.

Since the proposed increase in the allowable indicated temperature is based solely on a reduction of the existing instrument loop uncertainty value, there is no change in the containment pressure response, Loss of Coolant Accident (LOCA) and non-LOCA analyses, and there is no increase in risk associated with the post-accident heat removal. In addition, there are no identified adverse influences on risk associated with any other Design Basis Accident (DBA) and therefore a Probabilistic Risk Analysis (PRA) assessment is not needed for this change.

This proposed change is supported by an engineering calculation of the instrument loop uncertainty values associated with the upgraded precision temperature measuring equipment. With a higher precision method of temperature monitoring, there is an increased instrument loop accuracy and a corresponding reduction in the uncertainty value assumed in the heat removal calculations supporting the design basis events evaluated in the current analysis.

The upgraded precision temperature measuring instrumentation is installed and fully functional for both Units 1 and 2. The temperature instrumentation indicating loops are of an equivalent design to the original thermocouples and the method and procedures used to determine the CSCS pond temperature (i.e., the UHS) are unchanged from the thermocouples previously installed.

2.0 PROPOSED CHANGES

The proposed change to SR 3.7.3.1 is identified as follows:

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Verify cooling water temperature supplied to the plant from the CSCS pond is ≤ 101.25 °F.	24 hours

3.0 BACKGROUND

The UHS provides a heat sink for process and operating heat from safety related components during a transient or accident, as well as during normal operation. The Residual Heat Removal Service Water System (RHRSW) and Diesel Generator Cooling Water System (DGCW) are the principal systems that utilize the UHS to reject heat from safety related plant loads.

The UHS consists of an excavated CSCS pond integral with the cooling lake. The volume of the CSCS pond is sized to permit the safe shutdown and cooldown of both units for a 30-day period with no additional makeup water source available for normal and accident conditions. The UHS is the heat sink for heat removed from both units' reactor cores following all postulated accidents and anticipated operational occurrences in which the units are cooled down and Residual Heat Removal (RHR) is placed in service. The function of the CSCS pond is to provide for cooling of the RHR heat exchangers, diesel generator coolers, CSCS cubicle area cooling coils, RHR pump seal coolers, and Low Pressure Core Spray (LPCS) pump motor cooling coils. The CSCS pond provides indirect heat rejection for the containment through the RHR heat exchangers. The CSCS pond also provides a backup source of emergency makeup water for spent fuel pool cooling and can provide water for fire protection equipment. Neither the ability to provide emergency makeup water for spent fuel pool cooling nor fire protection is limited by heat rejection considerations. The operating limits for heat rejection capability are based on conservative heat transfer analyses for the design basis LOCA.

A single UHS supports both Units 1 and 2. The Circulating Water (CW) suction is drawn from a single intake canal and piped underground to the respective units' main condensers. The intake canal is relatively narrow with a high flow rate ensuring that there is thorough mixing prior to being drawn into the suction of the six (i.e., three per unit) circulating water pumps. The difference in piping configurations between the two units' underground supplies is minor. There are four temperature measuring devices located in the CW inlet thermowells (i.e., two per unit), that provide input to the Plant Process Computer (PPC) and are used to verify the UHS cooling water temperature supplied to the plant from the CSCS pond, therefore meeting the requirements of SR 3.7.3.1.

The reduction in the existing instrument loop uncertainty value does not affect the results of the heat removal calculations that ensure the post accident heat loads can be removed for 30 days without challenging the design bases of the mitigation systems.

Prolonged hot weather in the area over the past few summers has resulted in sustained elevated cooling water temperature supplied to the plant from the CSCS pond. High temperatures and humidity during the daytime, in conjunction with minimal cooling at night and little precipitation, have resulted in elevated water temperatures in the LSCS UHS. Continued hot weather conditions in the future may result in the temperature of the CSCS cooling pond challenging the current TS limit of 100°F.

This license amendment is being sought to increase the TS temperature limit of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F, by reducing the temperature measurement uncertainty through the use of higher precision temperature measuring equipment. Should the UHS temperature exceed 101.25°F, Required Action B.1 would be entered and both units would be placed in Mode 3 within 12 hours and Required Action B.2 would be entered requiring both units to be in Mode 4 within 36 hours.

4.0 TECHNICAL ANALYSIS

4.1 <u>Safety Analysis and Design Basis</u>

The UHS removes heat from both units' reactor cores following all postulated accidents and anticipated operational occurrences in which the units are cooled down and placed in Residual Heat Removal (RHR) operation. The function of the CSCS pond is to provide for cooling of the RHR heat exchangers, Diesel Generator (DG) coolers, CSCS cubicle area cooling coils, RHR pump seal coolers, and Low Pressure Core Spray (LPCS) pump motor cooling coils. The CSCS pond provides indirect heat rejection for the containment through the RHR heat exchangers.

The safety design basis for UHS are documented in the LSCS Updated Final Safety Analysis Report (UFSAR). In the unlikely event that the cooling lake dike is breached, the submerged pond (i.e., the CSCS cooling pond) is designed to provide the UHS for LSCS. The UHS is designed in accordance with Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 1, dated March 1974, which requires a 30-day supply of cooling water in the UHS. The basis provided in Regulatory Guide 1.27 was employed for the temperature analysis of the LSCS UHS to implement General Design Criteria 2, "Design bases for protection against natural phenomena," and Criteria 44, "Cooling water," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants."

Verification of the temperature of the water supplied to the plant from the CSCS pond (i.e., the UHS) ensures that the heat removal capabilities of the RHRSW System and DGCW System are within the assumptions of the Design Basis Analysis. To ensure that the maximum post-accident temperature of water supplied to the plant is not exceeded (i.e., 104°F), the temperature during normal plant operation must be maintained less than the TS limit. This TS limit accounts for the CSCS pond design requirement that it provide adequate cooling water supply to the plant (i.e., temperature ≤ 104°F) for 30 days without makeup, while taking into account solar heat loads and plant decay heat during the worst historical weather conditions. In addition, since the lake temperature follows a diurnal cycle (i.e., it heats up during the day and cools off at night), the allowable initial UHS temperature varies with the time of day. The allowable initial UHS temperatures, based on the actual sediment level and the time of day have been determined by analysis (i.e., Reference 9). The limiting initial UHS temperature

determined in this analysis ensures the maximum post-accident temperature of 104°F is not exceeded. This calculated initial temperature is an analytical limit that does not include instrument uncertainty or additional margin. This limiting initial temperature remains bounded by the proposed TS SR 3.7.3.1 limit of ≤ 101.25°F.

4.2 Operating Limits and Design Analyses

In 2005, LSCS performed an engineering evaluation (i.e., Reference 10) to assess the impact of higher inlet cooling water temperatures on plant components. This evaluation addressed the consequences of an increase in the temperature of cooling water supplied to the plant on both safety-related and non-safety related systems. For safety-related systems, the applicable components are part of the CSCS cooling system. These systems were evaluated at a conservatively higher inlet cooling water temperature of 106°F, versus the post accident peak inlet temperature of 104°F. The assessment was based on current plant equipment conditions (e.g., current equipment inspections, monitoring, heat exchanger tube plugging, and performance testing information).

The results of the evaluation demonstrated that the increased maximum inlet temperature of cooling water supplied to the plant from the CSCS pond will have no adverse affect on the safety-related plant heat exchangers or the heat loads they serve. The design requirements of these interfacing components (i.e., heat exchangers) have been reviewed and a determination made that thermal margin exists to allow for an increased cooling water inlet temperature, while maintaining an acceptable heat transfer capability.

Although margin exists to support increasing the actual inlet temperature, the proposed increase in the allowable indicated temperature is based solely on a reduction of the existing instrument loop uncertainty value, there is no change in the actual inlet temperature, therefore there is no change in the containment pressure response, LOCA and non-LOCA analyses, and there is no increase in risk associated with the post-accident heat removal. In addition, there are no identified adverse influences on risk associated with any other DBA and therefore, a PRA assessment is not needed for this change.

4.3 Instrument Uncertainty

This license amendment is being sought to increase the TS temperature limit of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F by reducing the temperature measurement uncertainty through the use of higher precision temperature measuring equipment. The existing conservative instrument uncertainty margin of 2°F is based on the previously installed thermocouple instrument loop uncertainty value of approximately ± 1.8°F, with 0.2°F margin added. The analysis considering the newly installed measuring devices uses the same maximum post accident temperature value of 104°F; however, the new analysis calculated an instrument measurement uncertainty of 0.74°F and conservatively uses a bounding margin of 0.75°F. Therefore the indicated UHS temperature may increase from the existing TS limit of ≤100°F to ≤101.25°F based on the improved instrument uncertainty. The current accident analyses results remain unchanged since the maximum UHS temperature realized using this new analysis assumption remains unchanged.

	Existing	Proposed
TS SR 3.7.3.1	≤100°F	≤101.25°F
Transient Heat up *	2.0 °F	2.0 °F
Instrument Uncertainty	± 1.8 °F	+ 0.74 °F
Additional Margin	± 0.2 °F	+ 0.01 °F
UHS Maximum Post Accident Inlet Temperature	104°F	104°F

* Note that the actual calculated value for transient heat up is 1.7°F; the value of 2.0 °F is used for conservatism.

The existing instrument uncertainty value of ±1.8 °F was developed consistent with the lowest level of the EGC graded approach methodology, only considering uncertainties for major loop components and adding an appropriate level of conservatism. It was not based on a rigorous evaluation of all potential uncertainty inputs. The uncertainty value of + 0.74 °F was determined by a rigorous evaluation of the same error terms that would be evaluated for an ESF/RPS setpoint using a two-sigma (2σ) single sided (increasing) confidence level.

Calculation L-003230 Revision 1 (i.e., Attachment 3) was prepared in accordance with the EGC Setpoint Methodology contained in Nuclear Engineering Standard NES-EIC-20.04, Revision 4, "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy," (i.e., Reference 11) for a Level 1 setpoint calculation. A Level 1 calculation applies to Limiting Safety System Setting (LSSS) values and uses the greatest rigor in determining the setpoint value to a 95/95 state (i.e., a 95 percent probability that limits will not be exceeded in 95 percent of the cases in which they are challenged). All uncertainties that could affect the setpoint are evaluated and included in the setpoint determination. It should be noted that the UHS temperature specified in SR 3.7.3.1 is not an LSSS; however, the Level 1 calculation methodology is being conservatively applied to determine the SR temperature value.

Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, provides guidance on instrument setpoint methodology. It also establishes that instrument settings for safety-related instrumentation should provide a 95 percent probability that limits will not be exceeded in 95 percent of the cases in which they are challenged. This has been interpreted to imply that measurement uncertainties should be established as ± 1.96 standard deviations for a normal probability distribution with two-sided uncertainty, or 1.645 standard deviations for one-sided uncertainty. General practice establishes uncertainty rounded to two standard deviations (i.e., 2-sigma (2σ)). The EGC Level 1 graded instrument uncertainty methodology is consistent with this guidance (i.e., evaluating random uncertainties at a 2σ level.)

The total instrument measurement uncertainty was calculated to be 0.74°F. The calculated uncertainty for one available loop is + 0.74°F and for two available instrument loops is + 0.53°F. It is considered extremely unlikely that three of the four RTDs or associated circuitry would be out of service simultaneously. In the unlikely event this condition was to occur, the 0.75°F allowance for conservatism bounds the instrument uncertainty associated with any combination of operable temperature measurement devices to meet the requirements of SR 3.7.3.1.

LSCS engineering calculation L-003230 Revision 1 which determined the uncertainty for the upgraded instrumentation is presented in Attachment 3.

4.4 Diurnal Cycle

Because the UHS follows a diurnal cycle (i.e., heats up during the day and cools down at night), the thermal response of the UHS following an accident is dependent upon the temperature of the lake and the time of day when the postulated design basis accident and failure of the dike occur. A parametric study of UHS performance was conducted using sediment level, time of day when the postulated failure of the dike occurs, and initial UHS temperature. Historically, the UHS temperature peaks in the late afternoon. Due to diurnal cooling, the UHS temperature slowly drops over the next several hours.

If the UHS temperature were to exceed the TS limit, diurnal cooling alone would be expected to return the temperature to less than the TS limit within a few hours. Given the time required to perform a concurrent orderly shutdown of two reactors, the UHS temperature would be returned to within the TS limit before the shutdown of either unit could be accomplished, thus restoring compliance with the Limited Condition for Operation (LCO). Increasing the allowable indicated UHS temperature to 101.25°F will reduce the likelihood of simultaneous and unnecessary transients on two large reactors.

4.5 Operational Considerations

There are four temperature measuring devices located in individual CW inlet thermowells (i.e., two per unit), that provide input to the PPC which are used to verify the UHS cooling water temperature supplied to the plant from the CSCS pond and therefore meet the requirements of SR 3.7.3.1. The new high precision resistance temperature detector (RTD) temperature measuring devices use the same CW inlet thermowells that were utilized by the thermocouples. The temperature measurements recorded from the newly installed RTDs show extremely close correlation between units and between individual RTDs that is well within the instrument performance predicted by the uncertainty analysis. Thus, it is considered that the CW temperature for any of the installed RTDs on either unit is representative of the UHS temperature.

The method for determining UHS temperature did not change with the installation of the upgraded measuring devices (i.e., RTDs). Operators perform a shiftly surveillance procedure, LOS-AA-S101(201), "Unit 1(2) Shiftly Surveillance," which includes recording the daily CW inlet temperature computer point average value for both units. As stated above, the CW temperatures for any of the installed RTDs on either unit is representative of the UHS temperature required to satisfy the 24-hour SR 3.7.3.1. There is no difference in determining the UHS temperature reading to satisfy TS requirements between the old configuration (i.e., thermocouples) and the new configuration (i.e., RTDs).

There are two computer points per unit for the actual RTD loop readings (i.e., F285 = LINE A COND INLET and F286 = LINE B COND INLET). There is also one calculated computer point per unit that provides the average inlet temperature (i.e., C361 = [F285 + F286]/2). The operators obtain the UHS temperature by averaging the Unit 1 and Unit 2 temperature readings (i.e., computer points U1C361 for Unit 1 and U2C361 for Unit 2) and perform a simple average by calculating (U1C361+U2C361)/2. If a unit does not have a CW pump in operation (i.e., the unit is shutdown), the operating department surveillance procedure directs the CW temperature to be recorded from the unit that does have a CW pump in operation.

There were no changes to any PPC, I/O, or workstation configuration as a result of installing upgraded measuring devices; however, the PPC database has been updated to reflect the relocation of the CW inlet temperature loop inputs from the thermocouple cards to the analog input cards. The current alarm setpoint on individual computer points are set at 100°F. Upon approval of the proposed change to increase the temperature limit of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F, the individual computer alarm points will be set to the new limit of 101.25°F.

The analysis considering the newly installed measuring devices uses the same peak temperature value of 104°F; however, the new analysis calculated an instrument measurement uncertainty of 0.74°F and conservatively uses a bounding margin of 0.75°F; therefore the indicated UHS temperature may increase from the existing TS limit of ≤100°F to ≤101.25°F. The current accident analyses results remain unchanged since the maximum UHS temperature realized using this new analysis assumption remains unchanged.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) is requesting a change to the Technical Specifications (TS) of Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. Surveillance Requirement (SR) 3.7.3.1 verifies the cooling water temperature supplied to the plant from the Core Standby Cooling System (CSCS) pond (i.e., the Ultimate Heat Sink (UHS)) is ≤ 100°F. Currently, if the temperature of the cooling water supplied to the plant from the CSCS pond is > 100°F, the UHS must be declared inoperable in accordance with TS 3.7.3. TS 3.7.3 Required Action B.1, requires that both units be placed in Mode 3 within 12 hours, and Required Action B.2 requires that both units be placed in Mode 4 within 36 hours.

Prolonged hot weather in the area over the past few summers has resulted in sustained elevated cooling water temperature supplied to the plant from the CSCS pond. High temperatures and humidity during the daytime, in conjunction with minimal cooling at night and little precipitation, have resulted in elevated water temperatures in the LSCS UHS. Continued hot weather conditions in the future may result in the temperature of the CSCS cooling pond challenging the current TS limit of 100°F.

This license amendment is being sought to increase the TS temperature limit of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F, by reducing the temperature measurement uncertainty through the use of higher precision temperature measuring equipment. Should the indicated UHS temperature exceed 101.25°F, Required Action B.1 would be entered and both units would be placed in Mode 3 within 12 hours and Required Action B.2 would be entered requiring both units to be in Mode 4 within 36 hours.

Since the proposed increase in the allowable indicated temperature is based solely on a reduction of the existing instrument loop uncertainty value, there is no change in the containment pressure response, Loss of Coolant Accident (LOCA) and non-LOCA analyses,

and there is no increase in risk associated with the post-accident heat removal. In addition, there are no identified adverse influences on risk associated with any other Design Basis Accident (DBA) and therefore a Probabilistic Risk Analysis (PRA) assessment is not needed for this change.

This proposed change is supported by an engineering calculation of the instrument loop uncertainty values associated with the upgraded precision temperature measuring equipment. With a higher precision method of temperature monitoring, there is an increased instrument loop accuracy and a corresponding reduction in the uncertainty value assumed in the current heat removal calculations supporting the design basis events evaluated in the current analysis.

The upgraded precision temperature measuring instrumentation is installed and fully functional for both Units 1 and 2. The temperature instrumentation indicating loops are of an equivalent design to the original thermocouples and the method and procedures used to determine the CSCS pond temperature (i.e., the UHS) are unchanged from the thermocouples previously installed.

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if 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; 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.

In support of this determination, an evaluation of each of the three criteria set forth in 10 CFR 50.92 is provided below regarding the proposed license amendment.

1. The proposed TS change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change will allow the indicated temperature of the cooling water supplied to the plant from the CSCS pond to be increased to ≤ 101.25°F based on reducing the temperature measurement uncertainty by use of higher precision temperature measuring equipment.

Analyzed accidents are assumed to be initiated by the failure of plant structures, systems, or components. An inoperable UHS is not considered as an initiator of any analyzed events. As such, there is not a significant increase in the probability of a previously evaluated accident. Allowing the UHS to operate at a higher allowable indicated temperature, but still within the design limits of the equipment it supplies, will not affect the failure probability of that equipment. The current heat analysis calculations of record for LSCS, Units 1 and 2, assume a UHS post-accident peak inlet temperature of 104°F. The proposed temperature increase is based solely on a reduction of the existing instrument loop uncertainty value. The current analysis bounds the proposed

change. This higher allowable indicated temperature does not impact the LOCA Peak Clad Temperature Analysis, LOCA Containment Analysis or the non-LOCA analyses; therefore, continued operation with a UHS temperature > 100°F but ≤ 101.25°F will not increase the consequences of an accident previously evaluated in the UFSAR.

Based on the above information, the increase in the allowable indicated temperature of the cooling water supplied to the plant from the UHS to ≤ 101.25°F by reducing the existing instrument loop uncertainty value has no effect on the result of the design basis event and will continue to allow each required heat exchanger to perform its safety function. The heat exchangers will continue to provide sufficient cooling for the heat loads during the most severe 30-day period.

Based on the above information, increasing the allowable indicated temperature of the cooling water supplied to the plant from the CSCS pond from ≤ 100°F to ≤ 101.25°F by reducing the instrument uncertainty value has no impact on any analyzed accident; therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **The proposed TS change does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

The proposed change involves newly installed upgraded precision temperature measuring equipment. This proposed action will not alter the manner in which equipment is operated, nor will the functional demands on credited equipment be changed. Raising the indicated UHS temperature limit does not introduce any new or different modes of plant operation, nor does it affect the operational characteristics of any safety-related equipment or systems; as such, no new failure modes are being introduced. The proposed action reduces the instrument uncertainty value but does not alter assumptions made in the safety analysis.

Increasing the allowable indicated temperature of the cooling water supplied to the plant from the CSCS pond from ≤ 100°F to ≤ 101.25°F has no impact on safety related systems. The plant is designed such that the RHR pumps on the unit undergoing the LOCA/LOOP conditions would start upon the receipt of a signal, and would load onto their respective Emergency Diesel Generators' emergency bus during the LOOP event. The increase in the allowable indicated temperature of the cooling water supplied to the plant from the CSCS pond will not require operation of additional RHR pumps; therefore, system operation is unaffected by the proposed change in the indicated UHS temperature limit.

Based on the above information, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **The proposed TS change does not involve a significant reduction in a margin of safety.**

The proposed change allows an increase in the allowable indicated temperature of the cooling water supplied to the plant from the CSCS pond to ≤ 101.25°F. The margin of safety is determined by the design and qualification of the plant equipment, the operation

of the plant within analyzed limits, and the point at which protective or mitigative actions are initiated. The proposed action does not impact these factors as the analyzed peak inlet temperature of the UHS is unaffected based on the improved instrument uncertainty of the upgraded high precision temperature measurement instrumentation. This change is supported by an engineering calculation of the instrument loop uncertainty values associated with upgraded precision temperature measuring equipment. The reduction in the uncertainty value associated with the temperature measuring equipment from ± 1.8°F to + 0.74°F is based solely on the use of more precise equipment. No setpoints are affected, and no other change is being proposed in the plant operational limits as a result of this change. All accident analysis assumptions and conditions will continue to be met. Adequate design margin is available to ensure that the required margin of safety is not significantly reduced.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluation, EGC concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

5.2 Applicable Regulatory Requirements/Criteria

The design of the Ultimate Heat Sink (UHS) must satisfy the requirements of 10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii), Criterion 3. These requirements state the following:

(ii) A Technical Specification Limiting Condition for Operation (TS LCO) of a nuclear reactor must be established for each item meeting one or more of the following criteria:

Criterion 3. A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

The proposed change does not relocate the UHS temperature limit from TS 3.7.3, "Ultimate Heat Sink," and therefore the Criterion 3 of 10 CFR 50.36(c)(2)(ii) continues to be met.

General Design Criteria 2, "Design bases for protection against natural phenomena," and General Design Criteria 44, "Cooling water," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," provides design considerations for the UHS. Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 1, dated March 1974, provides an acceptable approach for satisfying this criterion. The basis provided in Regulatory Guide 1.27, Revision 1, was employed for the temperature analysis of the LSCS UHS.

The reduction of the existing instrument loop uncertainty value does not affect the results of the heat removal calculations that ensure the post accident heat loads can be removed for 30 days without challenging the design bases of the mitigation systems.

Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, provides guidance on instrument setpoint methodology. It also establishes that instrument settings for

safety-related instrumentation should provide a 95 percent probability that limits will not be exceeded in 95 percent of the cases in which they are challenged. This has been interpreted to imply that measurement uncertainties should be established as ± 1.96 standard deviations for a normal probability distribution with two-sided uncertainty, or 1.645 standard deviations for one-sided uncertainty. General practice establishes uncertainty rounded to two standard deviations (i.e., 2σ).

This change is supported by an engineering calculation for the instrument loop uncertainty values for the upgraded precision temperature measuring equipment consistent with this guidance (i.e., evaluating random uncertainties at a 2σ level in a single increasing direction). With a higher precision method of temperature monitoring, there is an increased instrument loop accuracy and a corresponding reduction in the uncertainty value utilized in the current analyzed heat removal calculations for mitigation of the design basis events.

Since the proposed temperature increase is based solely on a reduction of the existing instrument loop uncertainty value, there is no change in the containment pressure response, LOCA and non-LOCA analyses, and there is no increase in risk associated with the post-accident heat removal. In addition, there are no identified adverse influences on risk associated with any other Design Basis Accident (DBA) and therefore, a Probabilistic Risk Analysis (PRA) assessment is not needed for this change.

Impact on Previous Submittals/Precedent

EGC has previously submitted and subsequently withdrawn a temporary amendment to increase the UHS temperature limit for LaSalle County Station, Units 1 and 2, dated August 2, 2001 as documented in References 1, 2 and 3. This request was withdrawn based on the temporary nature of the amendment and the moderation of local area temperature conditions.

EGC previously submitted a license amendment request to increase the LSCS, Units 1 and 2 UHS temperature on March 13, 2006, (i.e., Reference 5) that was subsequently denied by the NRC on November 3, 2006 (i.e., Reference 6). Following public meetings on January 26, 2007 and April 5, 2007 with the NRC, the amendment request submitted in Reference 12 as supplemented by this letter is a re-submittal of Reference 5 with the additional information and detail based on insights from these meetings.

6.0 ENVIRONMENTAL EVALUATION

EGC has evaluated this proposed operating license amendment consistent with the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments." EGC has determined that this proposed change meets the criteria for a categorical exclusion set forth in paragraph (c)(9) of 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," and as such, has determined that no irreversible consequences exist in accordance with paragraph (b) of 10 CFR 50.92, "Issuance of amendment." This determination is based on the fact that this change is being proposed as an amendment to the license issued pursuant to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for

Protection Against Radiation," or which changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria:

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 5.1, "No Significant Hazards Consideration," the proposed change does not involve any significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

The proposed change does not result in an increase in power level, does not increase the production nor alter the flow path or method of disposal of radioactive waste or byproducts. The proposed action would allow the operation of LSCS Units 1 and 2 with an increase in the allowable indicated temperature of the cooling water supplied to the plant from the CSCS pond up to ≤ 101.25°F; however, all accident analyses limits are met. It is expected that all plant equipment would operate as designed in the event of an accident to minimize the potential for any leakage of radioactive effluents; thus, there will be no change in the amounts of radiological effluents released offsite.

Based on the above evaluation, the proposed change will not result in a significant change in the types or significant increase in the amounts of any effluent released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

There is no net increase in individual or cumulative occupational radiation exposure due to the proposed change. The proposed action will not change the level of controls or methodology used for processing of radioactive effluents or handling of solid radioactive waste, nor will the proposed action result in any change in the normal radiation levels within the plant.

Based on the above information, there will be no increase in individual or cumulative occupational radiation exposure resulting from this change.

7.0 REFERENCES

1. Letter from K. A. Ainger (Exelon Generation Company, LLC) to NRC, "Application for Amendment to Technical Specifications Surveillance Requirement for the Ultimate Heat Sink Temperature," dated August 2, 2001
2. Letter from T. W. Simpkin (Exelon Generation Company, LLC) to NRC, "Withdrawal of License Amendment Requests Related to the Ultimate Heat Sink Temperature for the Braidwood and LaSalle County Stations," dated September 21, 2001
3. Letter from NRC to O. D. Kingsley (Exelon Generation Company, LLC), "LaSalle County Station, Units 1 and 2 – Withdrawal of Amendment Request (TAC Nos. MB 2564 and MB2565)," dated October 1, 2001

4. Letter from K. R. Jury (Exelon Generation Company, LLC), "Request for a License Amendment to Technical Specification 3.7.3, 'Ultimate Heat Sink', dated March 13, 2006

5. Letter from NRC to C. M. Crane (Exelon Generation Company, LLC), "LaSalle County Station, Units 1 and 2 – Denial of License Amendment," dated November 3, 2006

6. U. S. NRC to C. M. Crane (Exelon Generation Company, LLC), "LaSalle County Power Station, Units 1 and 2 – Request for Additional Information Related to Ultimate Heat Sink License Amendment Request," dated June 15, 2006

7. Letter from J. A. Bauer (Exelon Generation Company, LLC), "Additional Information Supporting the License Amendment Request to Technical Specification 3.7.3, "Ultimate Heat Sink," dated July 13, 2006

8. Letter from D. M. Benyak (Exelon Generation Company, LLC), "Additional Information Supporting the License Amendment Request to Technical Specification 3.7.3, "Ultimate Heat Sink," dated August 4, 2006

9. LSCS Design Analysis L-002457, Revision 5, "LaSalle County Station Ultimate Heat Sink Analysis"

10. LSCS Engineering Evaluation, Revision 1, "Assessment of High Lake Temperature on the Functionality of the Plant (Summer Readiness 2005)"

11. EGC Nuclear Engineering Standard NES-EIC-20.04, Revision 4, "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy"

12. Letter from D. M. Benyak (Exelon Generation Company, LLC) to U. S. NRC, "Request for a License Amendment to Technical Specification 3.7.3, 'Ultimate Heat Sink,'" dated June 29, 2007

ATTACHMENT 3

LASALLE COUNTY STATION
UNITS 1 and 2

Docket Nos. 50-373 and 50-374

License Nos. NPF-11 and NPF-18

Calculation L-003230, "CW Inlet Temperature Uncertainty Analysis," Revision 001

ATTACHMENT 1
Design Analysis Major Revision Cover Sheet

Design Analysis (Major Revision) | **Last Page No.** [6] 14

Analysis No.: [1] L-003230 | **Revision:** [2] 001

Title: [3] CW Inlet Temperature Uncertainty Analysis

EC/ECR No.: [4] 366827 | **Revision:** [5] 0

		Component(s): [14]	
Station(s): [7]	LaSalle		
Unit No.: [8]	1, 2	1TE-CW010	2TE-CW010
Discipline: [9]	I & C	1TE-CW011	2TE-CW011
Descrip. Code/Keyword: [10]	I04	1TT-CW010	2TT-CW010
Safety/QA Class: [11]	NS	1TT-CW011	2TT-CW011
System Code: [12]	CW	U1 Computer Point F285	U2 Computer Point F285
Structure: [13]	N/A	U1 Computer Point F286	U2 Computer Point F286

CONTROLLED DOCUMENT REFERENCES [15]

Document No.:	**From/To**	**Document No.:**	**From/To**

Is this Design Analysis Safeguards Information? [16] **Yes** ☐ **No** ☒ If yes, see SY-AA-101-106

Does this Design Analysis contain Unverified Assumptions? [17] **Yes** ☐ **No** ☒ If yes, ATI/AR#:

This Design Analysis SUPERCEDES: [18] **in its entirety.**

Description of Revision (list affected pages for partials): [19] Revised Total Uncertainty section to evaluate total uncertainty using 2σ Single Sided random error term. Added reference to ISA-RP67.04.02-2000. Corrected typo in Section 6.2.1.3.

Preparer: [20] T. J. Van Wyk (Print Name) — [signature] (Sign Name) — 8/1/07 (Date)

Method of Review: [21] **Detailed Review** ☒ **Alternate Calculations (attached)** ☐ **Testing** ☐

Reviewer: [22] Vikram R. Shah (Print Name) — [signature] (Sign Name) — 8/1/07 (Date)

Review Notes: [23] Independent review ☒ Peer review ☐

(For External Analyses Only)

External Approver: [24] ______ (Print Name) ______ (Sign Name) ______ (Date)

Exelon Reviewer: [25] ______ (Print Name) ______ (Sign Name) ______ (Date)

Independent 3rd Party Review Reqd? [26] **Yes** ☐ **No** ☒

Exelon Approver: [27] John Rommel (Print Name) — [signature] (Sign Name) — 8/1/07 (Date)

CALCULATION TABLE OF CONTENTS

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ATTACHMENTS:		
A. Minco® Quotation 160056-2, January 26, 2006	A1– A1	
B. Minco® Drawing S100995, dated 4/27/99	B1– B1	
C. E-mail from Keith Jensen of Minco® to Vikram Shah of LaSalle dated 7/25/06	C1– C1	
D. ifm efector600® TR2432 Operating Instructions, 701724/01, dated 02/04 **(Partial)**	D1 – D2	
E. Letter from Ameera Shah of ifm efector to Vikram Shah of LaSalle dated 7/26/06	E1– E1	
F. Fluke® 45 Dual Display Multimeter User's Manual, Rev. 4, dated 07/97 (Specification Page only)	F1– F1	
G. SOLA® SDN Power Supplies Specifications for SDN 2.5-24-100P	G1– G1	
H. RTP® RTP2000 Setup and Installation Guide, UG-2000-001, dated 9/12/02 **(Partial)**	H1– H1	
I. Minco Report of Calibration for Platinum RTD, Model S100995PD, Serial No. P/N366 **(Partial)**	I1 – I2	
J. HP 34401A Multimeter User's Guide, Edition 4, printed February 1996 (Specification Page only)	J1– J1	

1 PURPOSE / OBJECTIVE

1.1 The purpose of this calculation is to evaluate the loop uncertainty for the CW Inlet Temperature Indication Loops. These are revised instrument loops that were implemented by EC359060 for Unit 1 and EC359114 for Unit 2.

1.2 These instrument loops provide Ultimate Heat Sink (UHS) temperature indication via the Plant Process Computer (PPC). These new loop configurations replaced the existing thermocouples 1(2)CW010/011 (the sensing elements for computer points F285/F286) with new RTD temperature sensing elements and new temperature compensators (transmitters), and relocated the computer inputs to the appropriate Input/Output (I/O) analog input cards.

2 METHODOLOGY AND ACCEPTANCE CRITERIA

2.1 The methodology used for this calculation is based on NES-EIC-20.04 "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy", Rev. 4 (Reference 5.1.2). Additionally, for calculating the average uncertainty using up to four indicating loops, the multiple test criterion of ASME PTC 19.1 (Ref. 5.1.4), Section 3.2 was used.

2.2 The instrumentation evaluated in this calculation provides indication (via the Plant Process Computer) for Ultimate Heat Sink Temperature. This is a non-safety indication loop, but the indication is used to verify the Technical Specification SR 3.7.3.1 is met. In accordance with Reference 5.1.2, Appendix D, a Level 3 evaluation is appropriate for this analysis.

2.2.1 However, in response to questions during the NRC review of the License Amendment Request to increase the UHS temperature surveillance requirement value, this analysis will evaluate all uncertainty terms and determine the total uncertainty value using methodology consistent with safety-related indicating loops (Reference 5.1.2, Appendix D, Level 2).

2.2.2 For additional conservatism, this calculation will determine the total uncertainty using methodology consistent with safety-related actuation loops (Reference 5.1.2, Appendix D, Level 1), but applying the random error as a 2σ single sided uncertainty value. (Reference 5.1.5, Section 8, p.53)

2.3 Temperature, humidity and pressure errors, when available from the manufacturer, are to be evaluated with respect to the conditions specified in the station EQ Zones. If not provided, an evaluation must be made to ensure that the environmental conditions are bounded by the manufacturer's specified operational limits. If the environmental conditions are bounded, these error effects are considered to be included in the manufacturer's reference accuracy.

2.4 Published instrument vendor specifications are considered to be based on sufficiently large samples so that the probability and confidence level meets the 2σ criteria, unless stated otherwise by the vendor (Reference 5.1.2, Appendix A, Section 8.0).

2.5 For normal error analysis, normal vibrations and seismic effects are considered negligible or capable of being calibrated out in accordance with Appendix I of Reference 5.1.2.

2.6 The calibration standard error is considered negligible; the calibration standard error (STD) is more accurate than the M&TE by a ratio of at least 4:1 (Reference 5.1.2, Appendix A, Section 5.1.4).

2.7 The insulation resistance error is considered negligible unless the instrumentation is expected to operate in an abnormal or harsh environment (Reference 5.1.2, Appendix A, Section 7.0).

2.8 Reference 5.1.2, Appendix I states that the effects of normal radiation are small and accounted for in the periodic calibration process. Outside of containment during normal operation, the uncertainty introduced by radiation effects on components is considered to be negligible.

3 ASSUMPTIONS AND LIMITATIONS

3.1 Evaluation of M&TE errors for the digital multimeter is based on the assumption that the test equipment listed in Section 4.5 is used.

3.2 It is assumed that the calibration standard of the equipment utilized is more accurate than the M&TE equipment by a ratio of at least 4:1 such that the calibration standard errors can be considered negligible with respect to the M&TE specification per Section2.6. This is considered a reasonable assumption since M&TE equipment is certified to its required accuracy under laboratory conditions.

4 DESIGN INPUTS

4.1 The new instrument loops will consist of the following components: high accuracy RTD temperature elements, temperature transmitters, precision input resistors at the field input to the I/O card, and the D/A conversion in the PPC I/O equipment. The loop components evaluated in this document have the following specifications:

4.1.1 New Minco RTDs in the existing thermowells (replacing the existing thermocouples). The new RTDs have the following performance specifications (Ref. 5.4.1):

Repeatability: ±0.2°F

[The RTDs are designed to EN60751 Class A specifications with high precision and repeatability requirements. Thus, this specification could be considered to be at a 3σ confidence level. However, for conservatism, this specification will be used as a 2σ value.]

Drift: ±0.1°F/year (Ref. 5.4.3)

[The study in Reference 5.5.3 shows that RTDs are inherently stable, and after the first few months following installation RTDs attain a stable condition from which it may not drift sufficiently to exceed accuracy limits. RTD cross-calibration is performed to identify if an element has experienced significant drift. Although the RTDs are not separately calibrated, for conservatism the vendor's drift value will be expanded using the loop calibration interval of 4 years (+ 1 year late factor).]

4.1.2 The resistance value equivalent to the temperature value of interest (101.5°F) for the RTDs was obtained from the Minco calibration reports for the RTDs installed at LaSalle (Ref. 5.4.10). The highest of the four resistance values was 115.013Ω. This value will be used to determine the M&TE error for the indicating loop (applied to Module 2). The change in resistance per 1°F change in temperature (0.214Ω/°F) was also obtained using the actual resistance values in the calibration reports for 101.5°F and 102.5°F.

4.1.3 New ifm® efector600 TR2432 temperature transmitter modules. These new modules have the following performance specification (Ref.5.4.4, 5.4.5):

Accuracy (includes drift): ±0.54°F / 2 years
"Temperature Drift": ±0.1% of measured range/ 10°C

[Note: Ref. 5.4.5 indicates that the accuracy specification includes drift error and is warranted to hold the accuracy and drift within the specified value for 2 years. It further states that testing is performed on 100% of the devices after production to verify conformance with these specifications. Therefore, these values are 3σ confidence level. It also states that the accuracy specification includes the

resolution error and electronic component drift, and that there are no other environmental influences that will affect the accuracy specification.]

4.1.4 PPC I/O input card. The I/O input cards have the following performance specification (Ref.5.4.9): [2σ]

Accuracy: ±0.025% of full scale (30°F to 120°F)

4.2 RTD extension wire has the identical conductor types as the RTD, and therefore there is no emf drop or change in conductor size at the point of connection on the RTD (Ref. 5.4.2).

4.3 The Instrument Loop power supply is a SOLA® SDN 2.5-24-100P (Ref. 5.4.8), which has the following performance specifications: [2σ]

Output tolerance:	± 2% overall (combined Line, load, time, and temperature related changes)
Temperature range:	-10°C to 60°C
Humidity:	< 90% RH, non-condensing

4.4 The precision signal resistor at the input terminals of the I/O card (Module 3) is a high-precision resistor with a tolerance of ± 0.02% (Reference 5.3.2) [2σ]

4.5 The loop is calibrated using a variable resistance input (to simulate the RTD input), measured with either a Fluke 45 DMM or an HP 34401A, and reading the indicated temperature at the PPC. The calibration procedures (Ref. 5.2.1 and 5.2.2) each specify that one loop will be calibrated using either the Fluke 45 OR the HP 34401A. The other loop must be calibrated using the other DMM.

4.5.1 Reference Accuracy for the Fluke 45 (medium speed) on the 300Ω range is:

(± 0.05% reading + 2 LSD + 0.02Ω) (Ref. 5.4.6) [2σ]

4.5.2 Reference Accuracy for the HP 34401A on the 1kΩ range is:

± (0.01% reading + 0.001% range) (Ref. 5.4.7) [2σ] .

Temperature coefficient for the HP 34401A on the 1kΩ range is (for 0°C to 18°C and 28°C to 55°C):

± (0.0006% of reading + 0.0001% of range /°C) (Ref. 5.4.7) [2σ]

4.6 LOCAL SERVICE ENVIRONMENTS (Ref. 5.5.2)

Table 4.6

	RTDs	Ifm efector600 TR2432	Plant Process Computer
EQ Zone	H7		C1A
Location	Turbine Bldg		Control Room (Computer Room)
Temperature	83°F to 102°F		50 to 104°F (Normal: 65 to 85°F)
Pressure	0 "wc		0.125 to +3.0 "wc
Humidity	39 to 47% RH		2.6 to 90% RH [see note below]

[Note: Per reference 5.5.2, the normal expected humidity in this zone is 20 to 50% RH]

4.7 Calibration Tolerance

The calibration tolerance for these indication loops is ± 0.54°F. Per Ref. 5.1.2, this is a 3σ value.

5 REFERENCES

5.1 METHODOLOGY

5.1.1 ANSI/ISA-S67.04-Part 1-1994, "Setpoints for Nuclear Safety Related Instrumentation"

5.1.2 NES-EIC-20.04, "Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy," Revision 4

5.1.3 ANSI/ISA TR67.04.09, "Graded Approaches to Setpoint Determination," dated 10/15/05

5.1.4 ASME PTC 19.1, Part 1, "Measurement Uncertainty," 1985

5.1.5 ISA-RP67.04.02-2000, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."

5.2 PROCEDURES

5.2.1 LIP-CW-501 [New loop-specific calibration procedure in development; tracked by EC359060]

5.2.2 LIP-CW-601 [New loop-specific calibration procedure in development; tracked by EC359114]

5.3 LASALLE STATION DRAWINGS

5.3.1 1E-2-4022ZC "Schematic Diagram, Circulating Water System CW Pt. 3," as revised by EC359114.
1E-1-4022ZC "Schematic Diagram, Circulating Water System CW Pt. 3," Revision D.

5.3.2 1 E-2-4707AA, "Wiring Diag Analog Input Cab 2C91-P607 AITs 1,2,3,4 Left Side," as revised by EC359114,
1 E-1-4707AA, "Wiring Diag Analog Input Cab 1C91-P607 AITs 1,2,3,4 Left Side," Revision R.

5.4 VENDOR PRODUCT INFORMATION

5.4.1 Minco® Quotation 160056-2, January 26, 2006

5.4.2 Minco® Drawing S100995, dated 4/27/99

5.4.3 E-mail from Keith Johnson or Minco® to Vikram Shah of LaSalle dated 7/25/06

5.4.4 ifm efector600® TR2432 Operating Instructions, 701724/01, dated 02/04

5.4.5 Letter from Ameera Shah of ifm efector to Vikram Shah of LaSalle dated 7/26/06

5.4.6 Fluke® 45 Dual Display Multimeter Users Manual, Revision 4, dated 07/97

5.4.7 HP 34401A Multimeter User's Guide, Edition 4, printed February 1996

5.4.8 SOLA® SDN Power Supplies Specifications for SDN 2.5-24-100P

5.4.9 RTP® 8436 Series Analog Input Cards Technical Manual, 981-0021-211A, Rev. A, dated 04-96

5.4.10 Minco Report of Calibration for Platinum RTD, Model S100995PD, Serial No. P/N366

5.5 OTHER REFERENCES

5.5.1 LaSalle Technical Specifications, Sections 3.7.3, B 3.7.3, Amendments 178/164

5.5.2 LaSalle UFSAR, Rev. 16, Tables 3.11-18 and 3.11-24

5.5.3 EPRI TR-103099, "Effects of Resistance Temperature Detector Aging on Cross-Calibration Techniques," Final Report dated June 1994

6 CALCULATIONS

6.1 RTD ERRORS (MODULE 1)

6.1.1 Random Errors **σ1**

6.1.1.1 RTD Reference Accuracy **RA1**

The RTD Reference Accuracy is ±0.2°F (Section 4.1.1). This is a 2σ value.

$RA1_{2\sigma}$ = ± 0.2°F / 2

RA1 = ± 0.1°F

6.1.1.2 RTD Calibration Error **CAL1**

The RTDs are not separately calibrated. Therefore, there is no calibration tolerance for this module. (The loop calibration tolerance is applied to Module 2, which is the module that is adjusted during loop calibration.)

CAL1 = 0

6.1.1.3 RTD Setting Tolerance ST1

The RTDs are not separately calibrated. Therefore, there is no setting tolerance for this module. (The loop calibration tolerance is applied to Module 2, which is the module that is adjusted during loop calibration.)

ST1 = 0

6.1.1.4 Random Input Errors σ1in

The RTDs are the first modules in the loop. Therefore,

σ1in = 0

6.1.1.5 Drift Error D1

The RTD Drift value (IDE) specified by the vendor is ± 0.1°F/year. [2σ] The RTDs are not separately calibrated: RTD cross-calibration is performed to identify if an RTD has experienced significant drift. For conservatism the vendor's drift value will be expanded using the loop calibration interval (Section 4.1.1). The interval for these indicating loops is 4 years. The 25% late factor is 1year. (VDP is the vendor drift period, or 1 year in this case.)

$$D1_{2\sigma} = [IDE] \times [(SI + LF)/VDP)]^{1/2}$$
$$= [0.1°F] \times [(4 \text{ years} + 1\text{year})/1\text{year}]^{1/2}$$
$$= 0.1°F \times 2.236$$
$$= 0.224°F$$

D1 = 0.112°F

6.1.1.6 RTD Random Error **σ1**

$$\sigma1 = \pm [(RA1n)^2 + (CAL1)^2 + (ST1)^2 + (\sigma 1in)^2 + (D1)^2]^{1/2}$$
$$= \pm [(0.1°F)^2 + (0)^2 + (0)^2 + (0)^2 + (0.112)^2]^{1/2}$$
$$= \pm 0.150\ °F$$

σ1 = ± 0.150 °F

6.1.2 Non-Random Errors **Σe1**

RTDs are passive devices that produce a resistance signal proportional to temperature. As such, they are not affected by the following non-random effects.

Humidity Effects:	eH1 = 0
Static Pressure Effects:	eSP1 = 0
Ambient Pressure Effects:	eP1 = 0
Power Supply Effects:	eV1 = 0
Seismic Effects:	eS1 = 0
Radiation Effects:	eR1 = 0
Process Effects:	ePr1 = 0

6.1.2.1 Insulation Resistance Errors **eIR1**

Insulation Resistance error is to be evaluated where actuation functions are expected to operate in an abnormal or harsh environment (Section 2.7). There are no terminal blocks in 100% relative humidity areas, therefore,

eIR1 = 0

6.1.2.2 Resistance Drop of the Extension Wire **eRD1**

Since the RTD extension wires are made of the same material as the RTD itself, there is no emf rise or drop across the RTD head terminals (Section 4.2)

eRD1 = 0

6.1.2.3 Temperature Errors **eT1**

RTDs are designed to exhibit a precise temperature effect that is used to develop the input signal to the loop. Since the RTDs are designed to function at temperatures well above the system design temperature, there is no temperature error other than the reference accuracy error. Therefore,

eT1 = 0

6.1.2.4 Non-Random Input Errors **e1in**

The RTD is the first module in the loop. Therefore,

e1in = 0

6.1.2.5 Non-Random Error **Σe1**

Σe1 = eH1 + eSP1 + eP1 + eV1 + eS1 + eR1 + eT1 + eIR1 + ePr1 + eIR1 + eRD1 + e1in
= 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 0°F

Σe1 = 0°F

6.2 TEMPERATURE TRANSMITTER ERRORS (MODULE 2)

6.2.1 Random Error **σ2**

6.2.1.1 Reference Accuracy **RA2**

Reference Accuracy is ± 0.54°F (Section 4.1.3). This is a 3σ value.

RA2 = ± 0.54°F / 3 = ± 0.18°F

Per Reference 5.4.5, this accuracy includes drift and is warranted for 2 years. The calibration interval is 4 years. The 25% late factor is 1year. (VDP is the vendor drift period, or 2 years in this case.) The formula for applying the surveillance interval to Drift will be applied to the entire RA2 error term.

$$RA2 = \pm [IDE] \times [(SI + LF)/VDP)]^{1/2}$$
$$= \pm [0.18^\circ F] \times [(4years + 1\ year)/2\ years)]^{1/2}$$
$$= \pm [0.18^\circ F] \times [1.581139]$$

$$\mathbf{RA2 = \pm 0.285^\circ F}$$

6.2.1.2 Calibration Error **CAL2**

The loop is calibrated using a variable resistance input, measured with a Fluke 189 DMM, and reading the indicated temperature at the PPC.

6.2.1.2.1 Measurement & Test Equipment Error **MTE2**

<u>HP 34401A</u>
Reference Accuracy is the manufacturer's accuracy (± 0.01% reading + 0.001% of range for the 1kΩ) as a 2σ value (Section 5.4.6). The highest reading of interest is 101.5°F. The Minco calibration reports for the RTDs show that the highest resistance value for this temperature is 115.013Ω. (Section 4.1.2)

$$RAMTE_{2\sigma} = \pm 0.01\% \times 115.013\Omega + (0.00001 \times 1000\Omega)$$
$$= \pm 0.0115\Omega + 0.01\Omega = 0.0215\Omega$$
$$= \pm 0.0215\Omega \times 1^\circ F/0.214\Omega = 0.100^\circ F$$
$$\mathbf{RAMTE2 = \pm 0.050^\circ F}$$

The manufacturer also specifies a Temperature coefficient for this range (1kΩ) for 0°C to 18°C and 28°C to 55°C as 0.0006% of reading + 0.0001% of range per °C. The normal turbine building ambient temperature in the zone where the transmitter is installed varies from 83°F to 102°F(Ref. 5.5.2). For additional conservatism, this range is expanded to 75°F to 102°F (or 23.9°C to 38.9°C). The lower temperature (23.9°C) is within the range where the coefficient is not applicable, so the applicable ΔT is: (38.9°C - 28°C) or 10.9°C

$$TEMTE2_{2\sigma} = \pm(0.0006\% \times 115.013\Omega) + (0.000001 \times 1000\Omega)$$
$$= \pm 0.00069\Omega + 0.001\Omega = \pm 0.00169\Omega$$
$$= \pm 0.00169\Omega \times 1^\circ F/0.214\Omega = 0.00789^\circ F$$
$$\mathbf{RAMTE2 = \pm 0.00395^\circ F}$$

The temperature error is a degradation of the specified accuracy and is not considered an additional random error. Therefore, the total M&TE error for the HP 34401A is:

$$MTE2 = \pm [(0.050^\circ F)^2 + (0.00395^\circ F)^2]^{1/2}$$

$$\mathbf{MTE2 = \pm 0.0502^\circ F}$$

<u>Fluke 45 (medium speed)</u>
Reference Accuracy is the manufacturer's accuracy [± (0.05% reading + 2 LSD + 0.02Ω)] as a 2σ value (Section 5.4.6). [The LSD for the Fluke 45 is 0.01Ω.] The highest reading of interest is 101.5°F. The Minco calibration reports for the RTDs show that the highest resistance value for this temperature is 115.013Ω. (Section 4.1.2)

$$RA_{2\sigma} = \pm(0.05\% \times 115.013\Omega) + [(2 \times 0.01\Omega) + 0.02\Omega]$$

$= \pm 0.0575\Omega + 0.04\Omega = 0.0975\Omega$
$= \pm 0.0975\Omega \times 1°F/0.214\Omega = 0.456°F$

MTE2 = ± 0.228°F

The Fluke 45 (med. speed) M&TE error is bounding and will be used to evaluate total loop uncertainty.

6.2.1.2.2 Calibration Standard Error **STD2**

The calibration standard error is evaluated as negligible (Section 3.2).

STD2 = 0

6.2.1.2.3 Loop Calibration Tolerance **ST2**

The calibration tolerance for this indicating loop is ± 0.54°F (Section 4.7). [3σ]

ST2 = ± 0.54°F / 3

ST2 = ± 0.18°F

6.2.1.2.4 Calibration Error **CAL2**

The total calibration error for the M&TE is:

$CAL2 = \pm [(MTE2)^2 + (STD2)^2 + (ST2)^2]^{1/2}$
$= \pm [(0.228°F)^2 + (0)^2 + (018)^2]^{1/2}$

CAL2 = ± 0.29°F

6.2.1.3 Ambient Temperature Error **σT2**

The vendor states the "temperature drift" error for the temperature transmitter as 0.1% of measuring range / 10°C (Ref. 4.1.3) [3σ]. This is applied in this calculation as an ambient temperature error. Measuring range: 30 to 120°F = 90°F.

The normal turbine building ambient temperature in the zone where the transmitter is installed varies from 83°F to 102°F(Ref. 5.5.2). For additional conservatism, this range is expanded to 75°F to 102°F (27°F difference).

$\sigma T2_{3\sigma} = \pm (0.1\% * Span)$
$= \pm [(0.001 * 90°F)/10°C \times (27°F \times 5°F/9°C)$
$= \pm 0.135 °F / 3$

σT2 = ± 0.045°F

6.2.1.4 Random Input Error **σ2in**

σ2in = σ1 = **± 0.150°F**

6.2.1.5 Power Supply Effects **σ2PS**

The transmitter specifications are valid for voltages between 20 and 30 vDC. The 24-volt power supply variability is less than ± 2% all errors combined (4.3). This is equal to 23.5vDC to 24.5vDC. Therefore,

σ2PS = ± 0 °F

6.2.1.6 Total Random Error **σ2**

$$\sigma 2 = \pm [(RA2)^2 + (CAL2)^2 + (\sigma T2)^2 + (\sigma 2in)^2 + (\sigma 2PS)^2]^{1/2}$$
$$\sigma 2 = \pm [(0.285°F)^2 + (0.290°F)^2 + (0.045°F)^2 + (0.150°F)^2 + (0°F)^2]^{1/2}$$

$$\boldsymbol{\sigma 2 = \pm 0.436°F}$$

6.2.2 Non-Random Error **Σe2**

6.2.2.1 Humidity Error **e2H**

No humidity effect errors are provided in the manufacturer's specifications, and the humidity conditions at the instrument location are within the operating limits of the module. Humidity errors are negligible during normal conditions. (Reference 5.1.2, Appendix I)

e2H = 0

6.2.2.2 Radiation Error **e2R**

No radiation errors are provided in the manufacturer's specifications. Per Section 2.8, it is reasonable to consider the normal radiation effect as negligible. Therefore,

e2R = 0

6.2.2.3 Seismic Error **e2S**

No seismic effect errors are provided in the manufacturer's specifications. A seismic event defines a particular type of accident condition. Therefore, there is no seismic error for normal operating conditions

e2S = 0

6.2.2.4 Static Pressure Offset Error **e2SP**

The transmitter is an electrical device and therefore not affected by static pressure.

e2SP = 0

6.2.2.5 Ambient Pressure Error **e2P**

The transmitter is an electrical device and therefore not affected by ambient pressure.

e2P = 0

6.2.2.6 Process Error **e2Pr**

The transmitter receives an analog input from an RTD. Any errors associated with the conversion of temperature to resistance have been accounted for as RTD errors. Therefore,

e2Pr = 0

6.2.2.7 Non-Random Input Error **e2in**

e2in = Σe1 = 0

6.2.2.8 Total Non-Random Error **Σe2**

$$\Sigma e2 = e2H + e2R + e2S + e2SP + e2P + e2Pr + e2in$$
$$= 0 + 0 + 0 + 0 + 0 + 0 + 0$$

$$\boldsymbol{\Sigma e2 = 0}$$

6.3 PPC I/O MODULE ERRORS (MODULE 3)

6.3.1 Random Error **σ3**

6.3.1.1 Reference Accuracy **RA3**

Reference Accuracy is ± 0.025% calibrated range (Ref. 5.4.9). The calibrated range is 30°F to 120°F (120°F – 30°F = 90°F).

$RA3_{2\sigma}$ = ±0.00025 x 90°F = 0.0225°F

RA3 = ±0.0113°F

6.3.1.2 Calibration Error **CAL3**

The I/O module is not separately calibrated; indication is verified during loop calibration.

CAL3 = ±0°F

6.3.1.3 Drift Error **D3**

The vendor does not specify a drift error specification for the I/O module.

D3 = ± 0°F

6.3.1.4 Random Input Error **σ3in**

σ3in = σ2 = **± 0.437°F**

6.3.1.5 Total Random Error **σ3**

$\sigma 3 = \pm [(RA3)^2 + (CAL3)^2 + (\sigma D3)^2 + (\sigma 3in)^2 + (\sigma 3r)^2]^{1/2}$

$\sigma 3 = \pm [(0.0113°F)^2 + (0.0°F)^2 + (0°F)^2 + (0.436°F)^2]^{1/2}$

σ3 = ± 0.436°F

6.3.2 Non-Random Error **Σe3**

6.3.2.1 Humidity Error **e3H**

No humidity effect errors are provided by the manufacturer'; specified RH for PPC equipment is 20 to 80% RH. The I/O module is located in EQ Zone C1A, (Section 4.6), where expected RH levels are 20 to 50%. Humidity errors are negligible. (Reference 5.1.2, Appendix I)

e3H = 0

6.3.2.2 Radiation Error **e3R**

No radiation errors are provided in the manufacturer's specifications. Per Section 2.8, it is reasonable to consider the normal radiation effect as negligible. Therefore,

e3R = 0

6.3.2.3 Seismic Error **e2S**

No seismic effect errors are provided in the manufacturer's specifications. A seismic event defines a particular accident condition. Therefore, there is no seismic error for normal operating conditions

e3S = 0

6.3.2.4 Static Pressure Offset Error **e3SP**

The I/O module is an electrical device and therefore not affected by static pressure.

e3SP = 0

6.3.2.5 Ambient Pressure Error **e3P**

The I/O module is an electrical device and therefore not affected by ambient pressure.

e3P = 0

6.3.2.6 Process Error **e3Pr**

The I/O module receives an analog current input from the transmitter. Any errors associated with the conversions of temperature to resistance, and resistance to current have been accounted for as errors associated with modules 1 and 2. Therefore,

e3Pr = 0

6.3.2.7 Input Signal Resistor Error **e3SR**

e3SR = ± (0.02% * Span) (Section 4.4)
= ± 0.0002 * 90°F
= ± 0.018 °F

e3SR = ± 0.018°F

6.3.2.8 Non-Random Input Error **e3in**

e3in = Σe2 = 0

6.3.2.9 Total Non-Random Error **Σe3**

Σe3 = e3H + e3R + e3S + e3SP + e3P + e3Pr + e3SR + e3in
= 0 + 0 + 0 + 0 + 0 + 0 + 0.018 + 0

Σe3 = 0.018

7 SUMMARY AND CONCLUSION (TOTAL ERROR)

7.1.1 As discussed in Methodology Section 2.2.1, Level 2 methodology is applied for determining Total Error for this indication loop:

TE = σ3 + Σe3
= ± (0.436°F)+ 0.018°F
= ± 0.454°F

TE = ± 0.454°F

Using the Level 2 methodology (1σ random error), total uncertainty for one CW Inlet Temperature Indication loop is ± 0.454°F

7.1.2 As discussed in Methodology Section 2.2.2, the methodology applied for determining Total Error for this indication loop calculates the random error at a 2σ level for a single sided variable:

TE	=	1.645*σ3 + Σe3	[2σ Single Sided]
	=	+ (1.645*(0.436°F))+ 0.018°F	
	=	+ 0.717°F + 0.018°F	
	=	+ 0.735°F	
TE	**=**	**+ 0.74°F**	

Therefore, using methodology similar to Level 1 (2σ Single Sided random uncertainty), the total uncertainty for one CW Inlet Temperature Indication loop is + 0.74°F

7.1.3 To obtain a more accurate value of the UHS temperature using these instruments, the average of the available values can be taken. This assumes that the four readings are sensing the same input temperature and that there is little effect between the input and the measurement point.

$$T_{CWAverage} = \frac{T_{1TE-CW010} + T_{1TE-CW011} + T_{2TE-CW010} + T_{2TE-CW011}}{4}$$

The accuracy of this process is considered the same as the accuracy of summing networks addressed in References 5.1.1 and 5.1.2, or by the multiple test criterion of Reference 5.1.4 Section 3.2.

In all of these cases the final random uncertainty (σ) is the square root sum of the squares of the individual channel random uncertainties considering the multiplier for each of the uncertainties is one divided by the number of channels that are being averaged. The non-random uncertainty (e) will remain the same as for a single loop (Ref. 5.1.4, Section 3.2).

$$\sigma_{Average} = \sqrt{\left(\frac{\sigma_1}{n}\right)^2 + \left(\frac{\sigma_2}{n}\right)^2 + \left(\frac{\sigma_3}{n}\right)^2 + \bullet \quad \bullet \quad \bullet \quad \bullet + \left(\frac{\sigma_n}{n}\right)^2}$$

If all of the instrument loops are identical then this equation will reduce to:

$$\sigma_{Average} = \frac{\sigma_i}{\sqrt{n}} + e$$

Thus for the CW temperatures, the accuracy of the average of the readings for **two loops** will be:

$$\sigma_{Average} = \frac{0.717}{\sqrt{2}} + e = 0.308 + 0.018 = 0.53\ ^\circ\text{F}$$

ATTACHMENT 4

LASALLE COUNTY STATION
UNITS 1 and 2

Docket Nos. 50-373 and 50-374

License Nos. NPF-11 and NPF-18

Markup of Proposed Technical Specifications Page Change

REVISED TS PAGE

3.7.3-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Verify cooling water temperature supplied to the plant from the CSCS pond is ≤ ~~100~~101.25°F.	24 hours
SR 3.7.3.2	Verify sediment level is ≤ 1.5 ft in the intake flume and the CSCS pond.	24 months
SR 3.7.3.3	Verify CSCS pond bottom elevation is ≤ 686.5 ft.	24 months

ATTACHMENT 5

LASALLE COUNTY STATION
UNITS 1 and 2

Docket Nos. 50-373 and 50-374

License Nos. NPF-11 and NPF-18

Typed Page

for

Technical Specifications Change

REVISED TS PAGE

3.7.3-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Verify cooling water temperature supplied to the plant from the CSCS pond is ≤ 101.25°F.	24 hours
SR 3.7.3.2	Verify sediment level is ≤ 1.5 ft in the intake flume and the CSCS pond.	24 months
SR 3.7.3.3	Verify CSCS pond bottom elevation is ≤ 686.5 ft.	24 months

ATTACHMENT 6

LASALLE COUNTY STATION
UNITS 1 and 2

Docket Nos. 50-373 and 50-374

License Nos. NPF-11 and NPF-18

Typed Pages for Proposed

Technical Specifications Bases

Page Changes

<u>REVISED TS BASES PAGES</u>

B 3.7.3-2 to B 3.7.3-5

BASES

APPLICABLE SAFETY ANALYSES (continued)

The UHS post-accident temperature is based on heat removal calculations (Ref. 5) that analyze for a maximum allowable post-accident inlet cooling water temperature of 104°F. To account for the worst-case scenario and to apply conservatism, the post-accident CSCS pond cooling water inlet temperature of 104°F consists of the CSCS pond TS temperature maximum of 101.25°F plus 2°F for transient heat up plus 0.75°F to account for instrument uncertainty (Ref. 6).

There are four temperature measuring devices located in the Circulating Water inlet thermowells (i.e., two per unit). The 0.75°F allowance bounds the instrument uncertainty associated with any combination of operable temperature measurement devices.

The UHS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

OPERABILITY of the UHS is based on a maximum water temperature being supplied to the plant of 101.25°F and a minimum pond water level at or above elevation 690 ft mean sea level. In addition, to ensure the volume of water available in the CSCS pond is sufficient to maintain adequate long term cooling, sediment deposition (in the intake flume and in the pond) must be ≤ 1.5 ft and CSCS pond bottom elevation must be ≤ 686.5 ft.

APPLICABILITY

In MODES 1, 2, and 3, the UHS is required to be OPERABLE to support OPERABILITY of the equipment serviced by the UHS, and is required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the UHS are determined by the systems it supports. Therefore, the requirements are not the same for all facets of operation in MODES 4 and 5. The LCOs of the systems supported by the UHS will govern UHS OPERABILITY requirements in MODES 4 and 5.

(continued)

BASES (continued)

ACTIONS

A.1

If the CSCS pond is inoperable, due to sediment deposition > 1.5 ft (in the intake flume, CSCS pond, or both) or the pond bottom elevation > 686.5 ft, action must be taken to restore the inoperable UHS to an OPERABLE status within 90 days. The 90 day Completion Time is reasonable based on the low probability of an accident occurring during that time, historical data corroborating the low probability of continued degradation (i.e., further excessive sediment deposition or pond bottom elevation changes) of the CSCS pond during that time, and the time required to complete the Required Action.

B.1 and B.2

If the CSCS pond cannot be restored to OPERABLE status within the associated Completion Time, or the CSCS pond is determined inoperable for reasons other than Condition A (e.g., inoperable due to the temperature of the cooling water supplied to the plant from the CSCS pond > 101.25°F, corrected for sediment level and time of day), the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

Verification of the temperature of the water supplied to the plant from the CSCS pond ensures that the heat removal capabilities of the RHRSW System and DGCW System are within the assumptions of the DBA analysis. To ensure that the maximum post-accident temperature of water supplied to the plant is not exceeded (i.e., 104°F determined in Ref. 4), the temperature during normal plant operation must be ≤ 101.25°F (Ref. 3). This is to account for the CSCS pond design requirement that it provide adequate cooling water supply to the plant (i.e., temperature ≤ 104°F) for 30 days

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1 (continued)

without makeup, while taking into account solar heat loads and plant decay heat during the worst historical weather conditions. In addition, since the lake temperature follows a diurnal cycle (it heats up during the day and cools off at night), the allowable initial UHS temperature varies with the time of day. The allowable initial UHS temperatures, based on the actual sediment level and the time of day have been determined by analysis (Ref. 5). The limiting initial UHS temperature of 102.3°F determined in this analysis ensures the maximum post-accident temperature of 104°F is not exceeded. These temperatures are analytical limits that do not include instrument uncertainty or additional margin. For example, if the lake temperature uncertainty and additional margin are determined to be 0.5°F, the limiting initial UHS temperature becomes 101.8°F. This limiting initial temperature remains bounded by the SR 3.7.3.1 limit of ≤ 101.25°F. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.3.2

This SR ensures adequate long term (30 days) cooling can be maintained, by verifying the sediment level in the intake flume and the CSCS pond is ≤ 1.5 feet. Sediment level is determined by a series of sounding cross-sections compared to as-built soundings. The 24 month Frequency is based on historical data and engineering judgment regarding sediment deposition rate.

SR 3.7.3.3

This SR ensures adequate long term (30 days) cooling can be maintained, by verifying the CSCS pond bottom elevation is ≤ 686.5 feet. The 24-month Frequency is based on historical data and engineering judgment regarding pond bottom elevation changes.

(continued)

BASES (continued)

REFERENCES

1. Regulatory Guide 1.27, Revision 2, January 1976.

2. UFSAR, Section 9.2.1.

3. UFSAR, Section 9.2.6.

4. EC 334017, Rev. 0, "Increased Cooling Water Temperature Evaluation to a New Maximum Allowable of 104°F."

5. L-002457, Rev. 5, "LaSalle County Station Ultimate Heat Sink Analysis."

6. L-003230, Rev. 1, "CW Inlet Temperature Uncertainty Analysis."