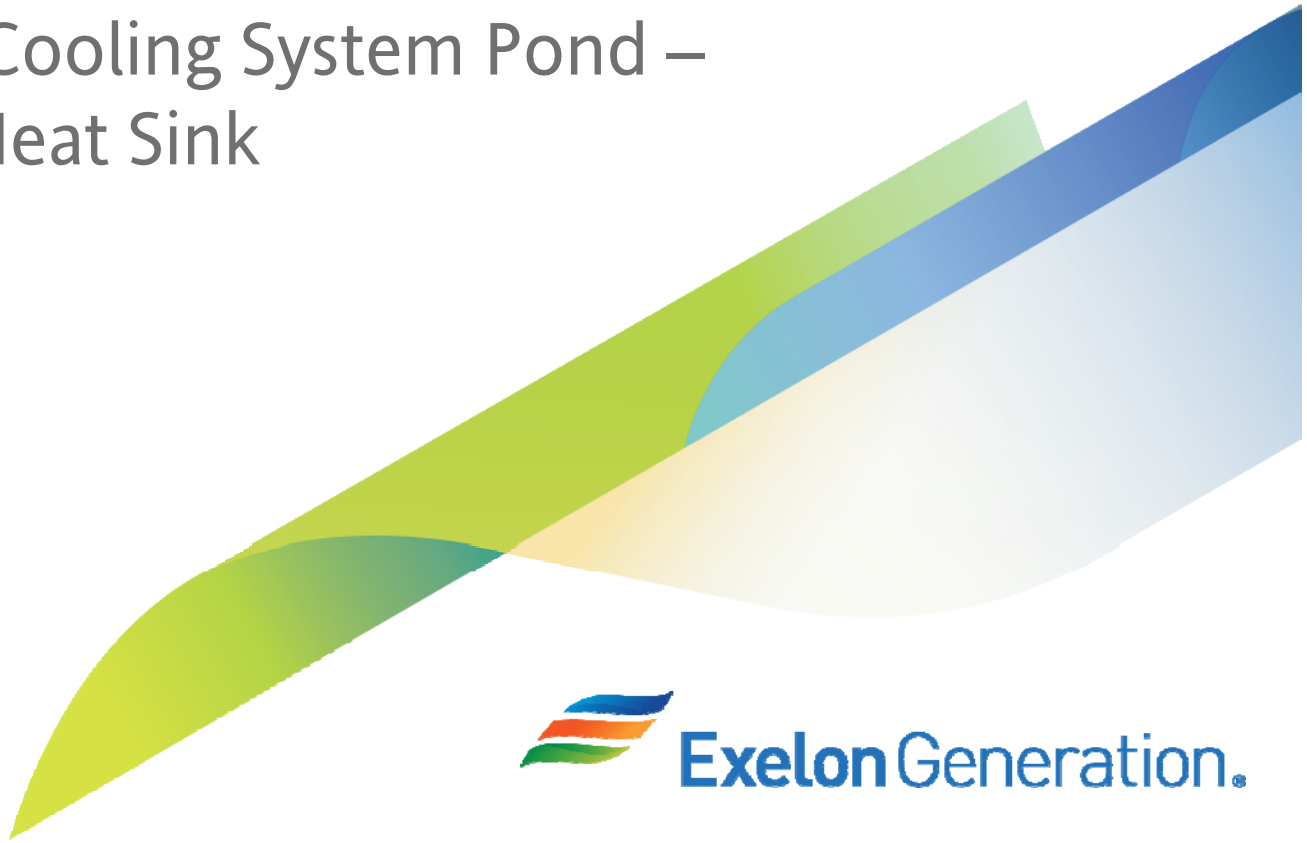
LaSalle County Station
Pre-Application Meeting

Core Standby Cooling System Pond – The Ultimate Heat Sink



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Agenda

- Introductions
- LaSalle County Station (LSCS) Ultimate Heat Sink (UHS) Background
- UHS Regulatory Requirements
- License Amendment Request (LAR) Scope
- Proposed Technical Specifications Changes
- Technical Justification for Proposed Changes
- Summary
- Discussion/Regulatory Challenges/Feedback
- Public Comments and Feedback

Introductions - Exelon Personnel in Attendance

- Terry Simpkin – LSCS Regulatory Assurance Manager
- Steve Shields – LSCS Regulatory Assurance
- Bill Hilton – LSCS Senior Design Engineering Manager
- Dan Schmit – LSCS Design Engineering Manager
- Mike Peters – LSCS Power Uprate
- Glen Kaegi – Director – Corporate Licensing and Regulatory Affairs
- David Gullott– Corporate Licensing Manager
- Mitch Mathews – Corporate Licensing

LaSalle County Station (LSCS) Core Standby Cooling System (CSCS) Pond – Ultimate Heat Sink (UHS) - Background

- The LSCS UHS:
  - Consists of a single water source - an excavated CSCS pond integral within the larger LSCS cooling lake
  - Serves as 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 CSCS pond is sized to contain sufficient volume to permit the safe shutdown and cooldown of both LSCS units for a 30 day period with no additional makeup water source available for normal and accident conditions
- 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
  - Low Pressure Core Spray (LPCS) pump motor cooling coils

LSCS UHS – Background (continued)

- The CSCS pond also provides:
  - Indirect heat rejection for the containment through the RHR heat exchangers
  - A backup source of emergency makeup water for spent fuel pool cooling
  - Water for fire protection equipment

Note: 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 loss of coolant accident (LOCA)
- There are four temperature measuring instruments used for monitoring the CSCS temperature provided to the plant:
  - Located in circulating water (CW) system inlet thermowells (i.e., two per unit)
  - Provide input to the Plant Process Computer (PPC)
  - Used to monitor and trend the temperature of the UHS cooling water temperature supplied to the plant from the CSCS pond
  - Used to verify the requirement of Technical Specifications (TS) Surveillance Requirement (SR) 3.7.3.1 is met at a 24-hour Frequency

LSCS UHS – Background (continued)

- The LSCS cooling lake is a relatively shallow perched lake (i.e., a perennial lake whose surface level lies at a higher elevation than the surrounding area; the lake was created by constructing dikes on three sides)
- The temperature of the cooling lake is sensitive to solar energy and ambient temperature, humidity, and wind speed
- In recent years, minimal cooling at night and high solar energy input along with high humidity and low wind speeds has resulted in elevated cooling water temperatures during the summer months
- Weather conditions in the future may result in the temperature of the UHS challenging the current TS limit of $\leq$101.25 °F

UHS Regulatory Requirements - GDC

- GDC 2: capability of structures housing the system and the system itself to withstand the effects of natural phenomena like earthquakes, tornadoes, hurricanes, and floods
- GDC 5: capability of shared systems and components important to safety to perform required safety functions
- GDC 44:
  A. The capability to transfer heat loads from safety-related structures, systems, and components (SSCs) to the heat sink under both normal operating and accident conditions
  B. Suitable component redundancy so that safety functions can be performed assuming a single, active component failure coincident with loss of offsite power
  C. The capability to isolate components, systems, or piping if required so safety functions are not compromised

UHS Regulatory Requirements – RG 1.27

- The LSCS UHS was designed and licensed in accordance with NRC Regulatory Guide (RG) 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 1 as discussed in Appendix B of the LSCS Updated Final Safety Analysis Report (UFSAR)
- Compliance with the four Regulatory Positions contained in RG 1.27, Revision 1 ensures that the LSCS UHS meets GDC 2, 5, and 44:
- Regulatory Position C.1 defines the required cooling capabilities of the UHS:
  - Sufficient cooling capability for 30 days to:
    - Permit simultaneous shutdown and cooldown of all reactor units the UHS serves
    - Maintain unit(s) in safe shutdown condition
    - Limit effects of accident on one unit while permitting shutdown, cooldown, and maintenance of safe shutdown on the remaining unit(s)
  - C.1.a defines the environmental parameters to be used in determining worst-case evaporation on UHS volume
  - C.1.b defines the environmental parameters to be used in determining worst case UHS temperatures

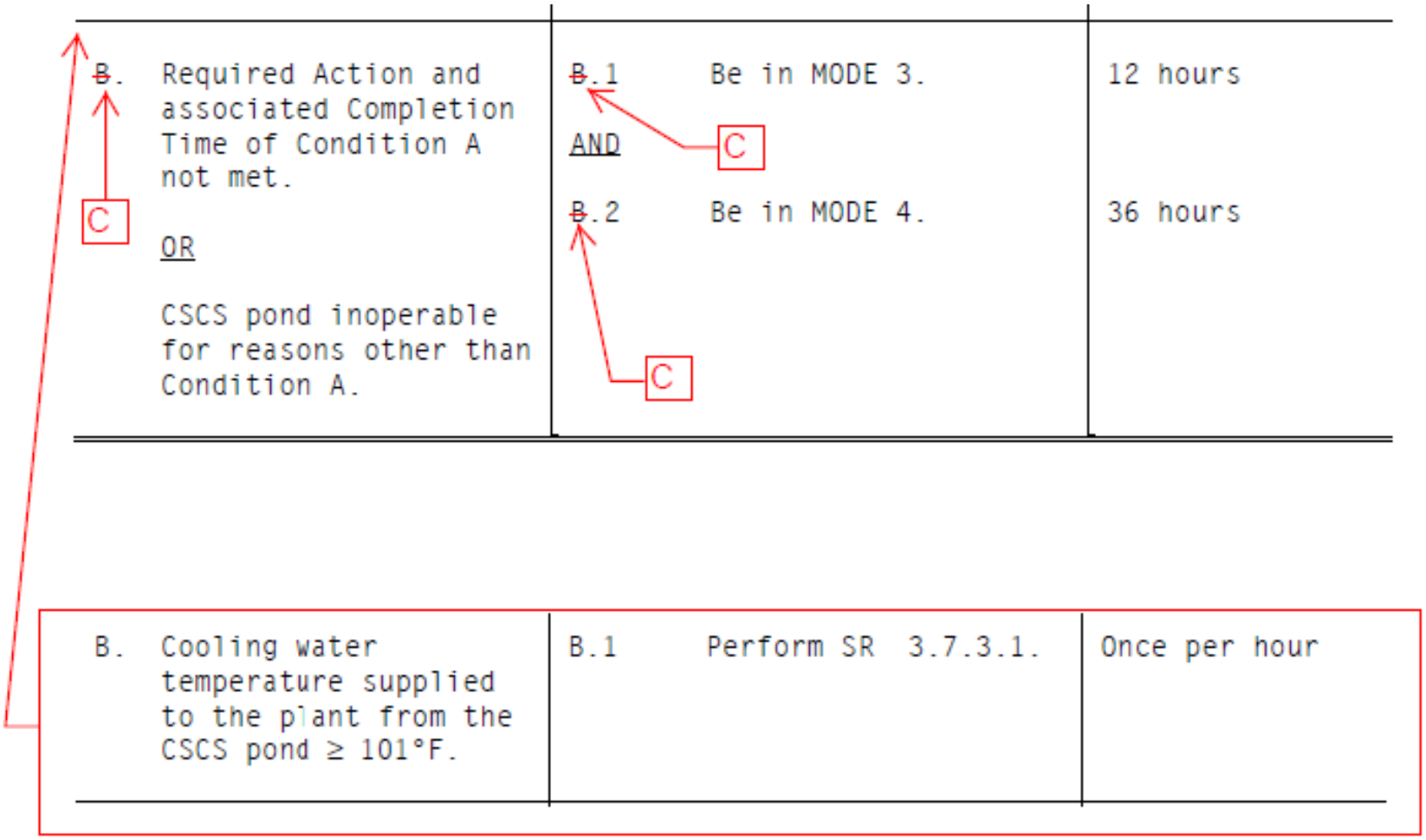
RG 1.27 (continued)

- Regulatory Position C.2 describes the events or natural phenomena that must be accounted for the in the design of the UHS
- Regulatory Position C.3 describes the requirements for the number of water sources that must be used in designing a UHS
- Regulatory Position C.4 describes the provisions for the plant TS related to actions to be taken in the event that conditions threaten partial loss of the capability of the UHS or the plant temporarily does not meet Regulatory C.1 and C.3 during operation

License Amendment Request Scope

- Revise Technical Specification (TS) 3.7.3, “Ultimate Heat Sink,” to modify acceptance criterion for verification of cooling water temperature supplied to the plant from the core standby cooling system (CSCS) pond
- Currently, Surveillance Requirement 3.7.3.1 verifies that cooling water from CSCS pond is $\leq$ 101.25 °F
- Proposal is to verify that cooling water temperature is less than a variable limit that is based on the analyzed diurnal temperature cycle of the CSCS pond
- Variable limit accounts for single-channel instrument uncertainty of 0.75 °F (two-channel uncertainty not more than 0.53 °F) and 0.3 °F of margin
- New Condition and associated Required Action to verify cooling water temperature is within limits on a once per hour frequency if above 101 °F
- No other changes to the Technical Specifications are proposed

Proposed TS 3.7.3 – UHS Changes



~~B~~.	Required Action and associated Completion Time of Condition A not met. OR CSCS pond inoperable for reasons other than Condition A.	~~B~~.1 AND ~~B~~.2	Be in MODE 3. Be in MODE 4.	12 hours 36 hours
B.	Cooling water temperature supplied to the plant from the CSCS pond ≥ 101°F.	B.1	Perform SR 3.7.3.1.	Once per hour

Proposed TS 3.7.3 – UHS Changes (continued)

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~~ within the limits of Figure 3.7.3-1.	In accordance with the Surveillance Frequency Control Program
SR 3.7.3.2	Verify sediment level is ≤ 1.5 ft in the intake flume and the CSCS pond.	In accordance with the Surveillance Frequency Control Program
SR 3.7.3.3	Verify CSCS pond bottom elevation is ≤ 686.5 ft.	In accordance with the Surveillance Frequency Control Program

Proposed TS 3.7.3 – UHS Changes (continued)

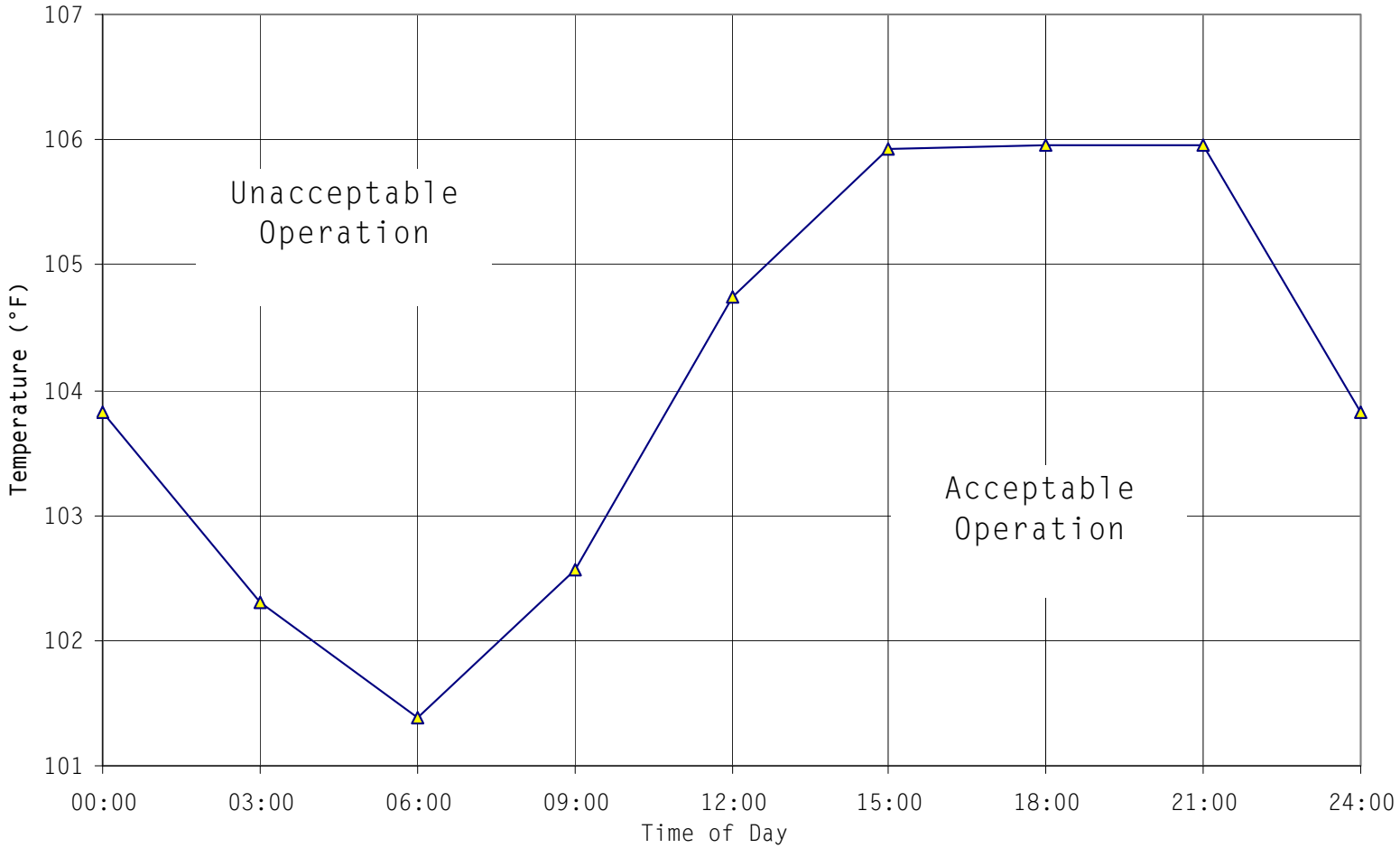


Figure 3.7.3-1 (page 1 of 1)
Temperature of Cooling Water Supplied to the Plant from the CSCS Pond Versus Time of Day Requirements

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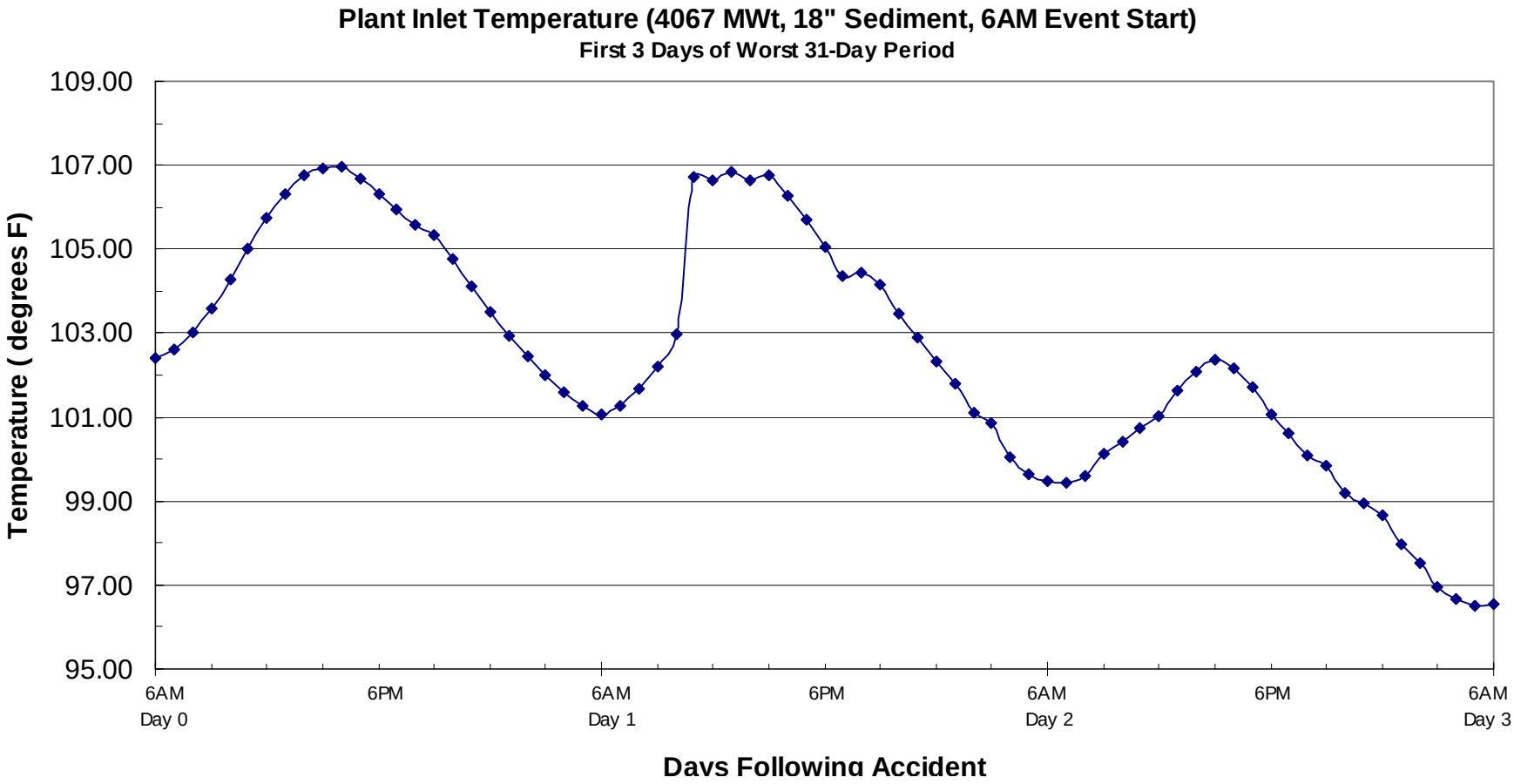
Technical Justification for Changes

- Basis for UHS transient analysis is RG 1.27, Rev. 1 and NUREG-0693, "Analysis of Ultimate Heat Sink Cooling Ponds"
- With design basis accident loss of coolant accident (DBA LOCA) on one unit, normal shutdown of the other
- Analysis performed for 4067 MWt vs. CLTP of 3546 MWt
- Determines allowable initial UHS temperature and water loss for updated historical weather data (i.e., July 1948 – Sept. 2010)
  - Data screened using NUREG-0693 methodology to determine worst single 24-hour and worst 30-day periods
  - Worst single 24-hour period begins July 24, 2001, at 7:00 a.m.
  - Worst 30-day period is July 21, 1995, to August 20, 1995
  - Worst 24-hour period followed by worst 30-day period used in analysis
  - Maximum evaporative loss period remains unchanged (June – July 1954)
- Methodology consistent with thermal model in NUREG-0693 - Utilizes Ryan wind function to account for evaporative losses

Technical Justification for Changes (cont)

- Analysis includes determination of CSCS pond effective surface area (~ 58 % of total surface area) and volume (~63% of total volume)
- Proposed maximum allowable UHS initial temperature based on:
  - Time of day
  - Maximum TS allowable sediment depth of 18”
  - Temperature monitoring instrumentation uncertainty
- Analyzed accident start times every 3 hrs for 24 hrs to determine start time resulting in most limiting initial UHS temperature (6 a.m., 102.4 °F)
- UHS temperature response over first 3 days and 31 days with worst weather and 6 a.m. accident start time provided
- Ensures peak post accident UHS temperature does not exceed safety related cooling water design basis of 107 °F

Technical Justification for Changes – Analysis Results



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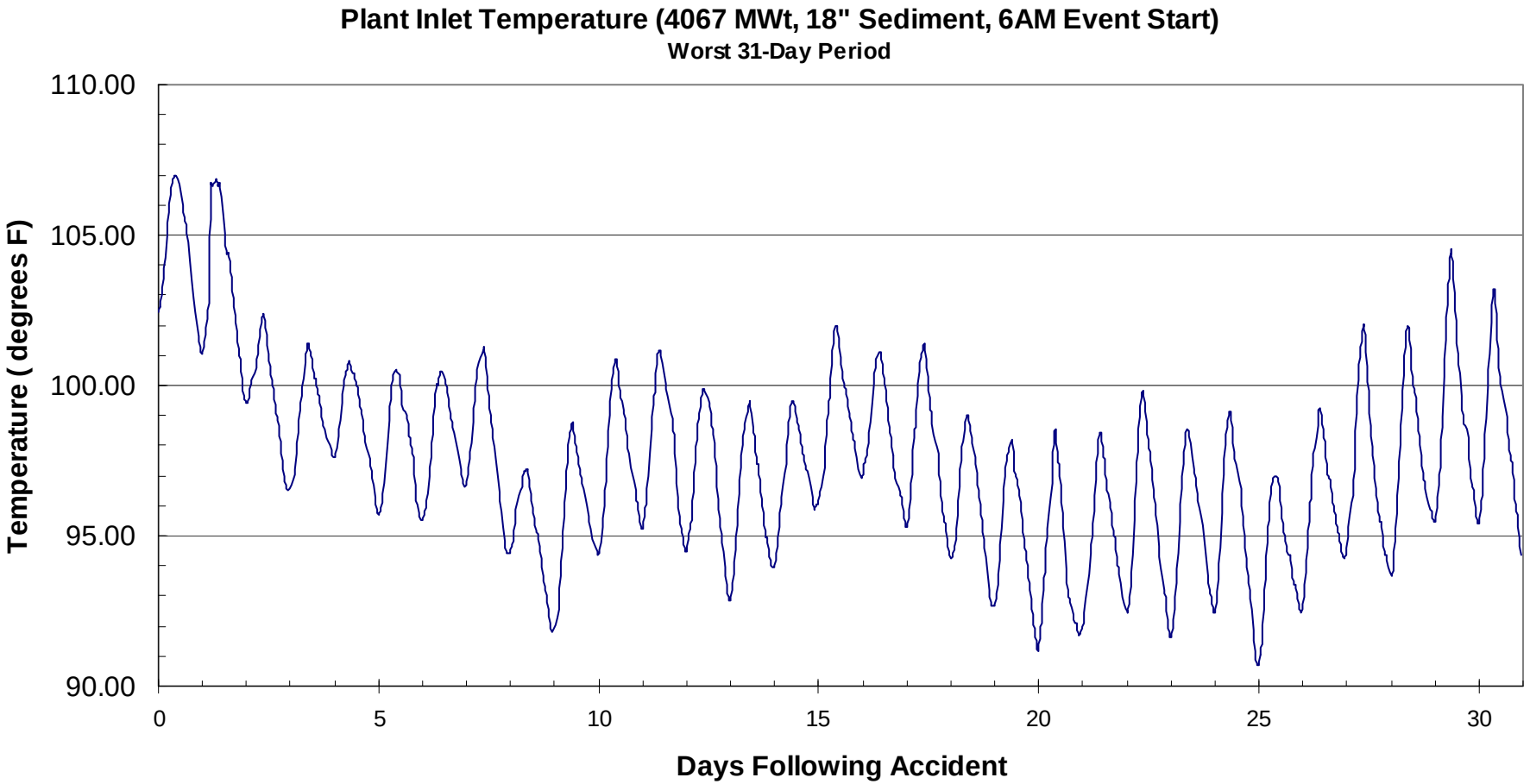
Technical Justification for Changes – Analysis Results



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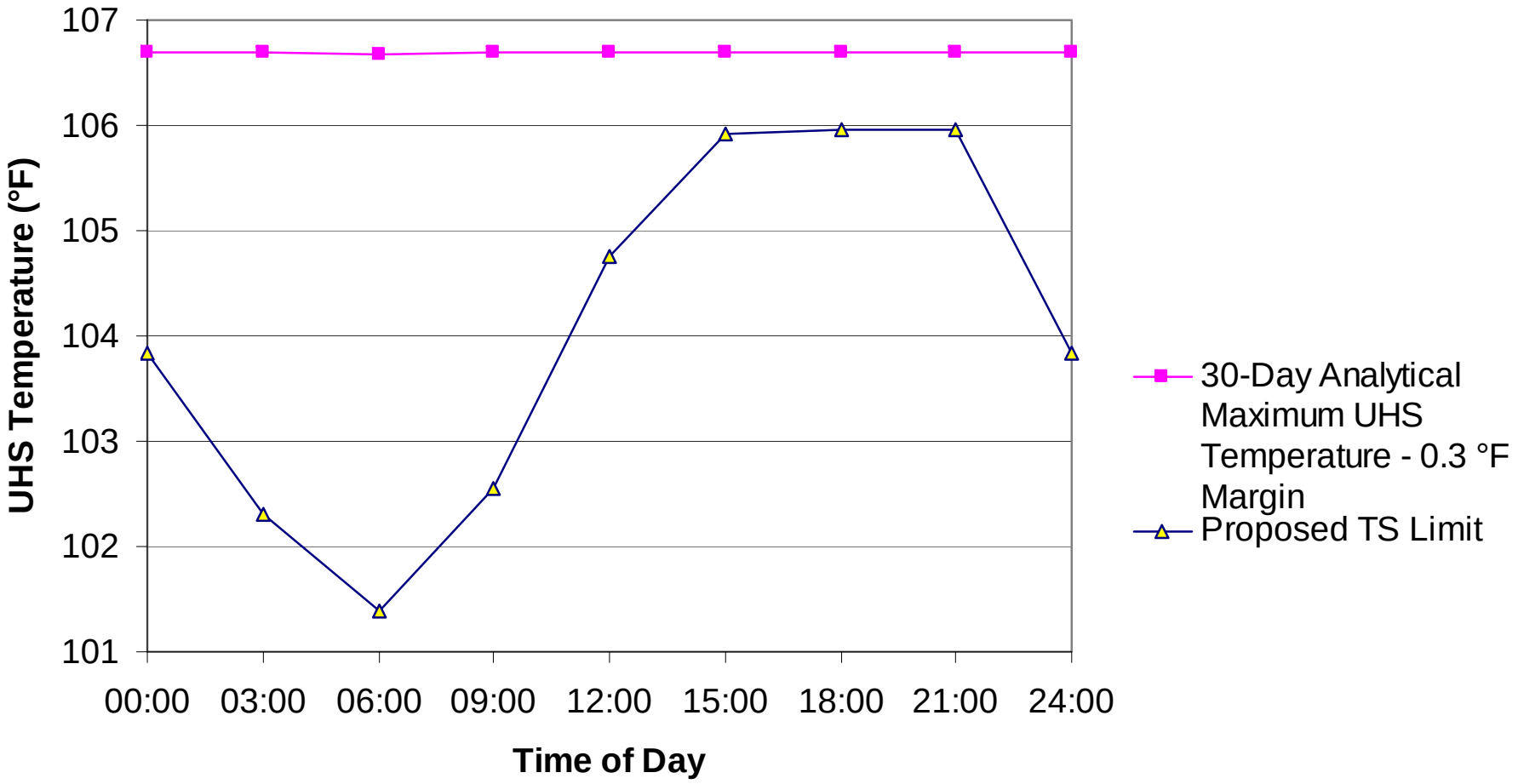
Technical Justification for Changes (cont)



UHS Temperature (°F) Versus Time of Day

Summary

- LaSalle lake temperatures continue to challenge the existing single-value TS limit for cooling water supplied to the plant from the CSCS pond
- Analysis performed in accordance with regulatory requirements
- Results ensure that cooling water design basis limit is not exceeded with additional conservatism
- Proposed changes:
  - Do not involve a significant increase in the probability or consequences of an accident previously evaluated
  - Continue to ensure that all systems will continue to be operated within their design capabilities, no new failure modes are introduced, nor is the possibility of a new or different kind of accident created through operation in the proposed manner
  - Do not involve a significant reduction in a margin of safety
  - Do not involve a significant hazards consideration

Discussion/Regulatory Challenges/Feedback