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AUTH.NAME AUTHOR AFFILIATION
HOVEY,R.J. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards request to NRC 980716 RAI re GL 96-06, "Assurance of Equipment Operability & Containment Integrity During Design Basis Accident Conditions."

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SEP 28 1998

L-98-240

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 251
Response to Request for Additional Information
NRC Generic Letter 96-06, Assurance of Equipment
Operability and Containment Integrity During Design
Basis Accident Conditions (TAC Nos. M96878 and M96879)

By letter dated July 16, 1998, the NRC issued a request for additional information related to Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions." In accordance with the NRC request, attached is the Florida Power and Light Co. response to the request for additional information regarding GL 96-06 for Turkey Point Units 3 and 4.

Should there be any questions, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

OIH

Attachments

cc: L. A. Reyes, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

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A072

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION - GENERIC LETTER 96-06

1.0 BACKGROUND

Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity during Design-Basis Accident Conditions," dated September 30, 1996, requested licensees to evaluate cooling water systems that serve containment air coolers to verify that the coolers were not vulnerable to waterhammer and/or two-phase flow conditions. By letter L-97-021, dated January 28, 1997, Florida Power and Light Co. (FPL) provided its response to GL 96-06 for Turkey Point Units 3 and 4. FPL acknowledged its vulnerability to the concerns cited in the GL and made commitments to resolve these concerns by installing modifications to preclude steam formation in containment coolers during the upcoming refueling outages. These modifications are now complete for Unit 4, and are being implemented on Unit 3, to complete by the end of the Fall 1998 refueling outage.

The modifications consist of the installation of new head tanks on the Component Cooling Water (CCW) System which serves the containment coolers. The new head tanks are, essentially, extensions of the existing surge tanks. The purpose of the new head tanks is to passively maintain sufficient system pressure to prevent possible voiding of the containment air coolers during a worst case large break Loss-of-Coolant-Accident (LOCA) coincident with a Loss-of-Offsite-Power (LOOP). The following provides a summary of the basic design parameters of the new head tanks:

Worst-case containment cooler temperature	270°F
Corresponding saturation pressure	27.1 psig
Required water column height to prevent voiding	64.9 ft[1]
High point elevation of containment coolers	73.5 ft
Maximum head tank level instrumentation error	+0.2 ft
Required minimum CCW head tank level	= 138.6 ft
CCW head tank low level alarm setpoint	139.13 ft
Nominal head tank operating level	144 ft

[1] Note that the required static water column height outside containment is based on a conservative 200°F (saturated) water density

2.0 NRC QUESTIONS AND FPL RESPONSES

1. Provide a detailed description of the "worst case" scenarios for waterhammer and two-phase flow, taking into consideration the complete range of event possibilities, system configurations, and parameters, and describe the minimum margin to boiling that will exist. For example, all waterhammer types and water slug scenarios should be considered, as well as temperatures, pressure, flow rates, load combinations, and potential component failures

   FPL Response

   Turkey Point has elected to install physical modifications to preclude voiding of the containment air coolers. Thus, the first portion of this question is not applicable to Turkey Point since waterhammer and two-phase flow analysis were not required for final resolution to GL 96-06.

   The second portion of the question requests identification of the minimum margin to boil. The new head tanks have been designed to maintain the containment coolers subcooled during a worst-case LOOP/LOCA event. The worst case containment cooler temperature has been determined to be 270°F. Thus, postulating that the water in the highest point of the highest cooler reached this temperature, the minimum margin to boil is 6" water at the low level alarm and 4 feet water at the nominal tank level. Note that this relatively low margin was selected in order to minimize the impact of the head tank installation on existing equipment and to prevent the need for possible system rerate.

   The limiting event has been determined to be a coincident LOOP/LOCA. The limiting large break LOCA assumes a double-ended reactor coolant pump suction line break with failure of either an emergency diesel, a containment spray pump, or an intake cooling water pump. This event results in a worst case cooler temperature of less than 270°F. Note that the large break LOOP/LOCA cases have been determined to be bounding over the Main Steam-Line-Break (MSLB)/LOOP cases with respect to cooler heat transfer. The LOCA cases provide a maximum heat flux applied to the containment coolers due to the associated high energy/mass release. The LOCA energy release bounds the MSLB cases. Furthermore in consideration of the primary mode of heat transfer for the event of concern (i.e. tubewise condensation), FPL determined that the post accident containment saturation temperature profile corresponding to the steam partial pressure for the large break LOCA cases is bounding.

2. Describe in detail any testing that was completed to confirm the analytical results, identify any shortcomings that exist, and explain how the test results assure conservatism in the analyses that were completed.

FPL Response

No special testing was required to confirm analytical results for the final resolution of GL 96-06. The basis of the final resolution is to passively maintain the containment air coolers above the saturation pressure (subcooled) corresponding to a worst-case containment cooler temperature of 270°F. The simplicity of the design does not require any testing to verify design parameters, e.g., saturation properties are well established. Therefore, this question is not applicable to Turkey Point.

3. **Describe and justify all assumptions and input parameters (including those used in any computer codes) that were used in the waterhammer and two-phase flow analyses. Confirm that these assumptions and input parameters are consistent with the existing design and licensing basis of the plant. Any exceptions should be explained and justified.**

FPL Response

As stated previously, Turkey Point did not perform waterhammer or two-phase flow analysis for the final resolution of GL 96-06. Therefore, this question is not applicable to Turkey Point.

4. **Explain and justify all uses of "engineering judgement" that were credited in the waterhammer and two-phase flow analyses**

FPL Response

As stated above, Turkey Point elected to address this concern by passively pressurizing the containment coolers. No waterhammer or two-phase flow analysis was performed for the final resolution of GL 96-06. Therefore, this question is not applicable to Turkey Point.

5. **Discuss specific system operating parameters and other operating restrictions that must be maintained to assure that the waterhammer and two-phase flow analyses remain valid (e.g., surge tank level, pressures, temperatures), and explain why it would not be appropriate to establish Technical Specifications requirements to acknowledge the importance of these parameters and operating restrictions. Also, describe and justify use of any non-safety-related instrumentation and controls for maintaining these parameters.**

FPL Response

To resolve the concerns identified by GL 96-06, Turkey Point elected to install new head tanks on the CCW system to maintain the containment air coolers subcooled during a worst case postulated large break LOCA/LOOP. The new head tanks are considered an extension of the original surge tanks. Therefore, the same criterion was applied in establishing operational,

instrumentation and technical specification requirements. The required elevation of the head tank level was determined to be 138.6 ft. The low level alarm setpoint of the tank was established at 139.13 ft. The nominal operating level is 144 ft. Operating procedures ensure that the head tanks are maintained above the low-level alarm.

The new head tanks are equipped with instrumentation equivalent to the existing surge tanks' instrumentation. The level parameters were changed to reflect the revised configuration with administrative limits placed on out-of-specification level. Non-safety indication is used to monitor level but utilizes seismically qualified level transmitters powered by a safety-related uninterruptable power supply. The new head tanks (and surge tanks) are provided with independent local indication and control room remote indication and alarm features.

The Technical Specifications associated with the CCW system were reviewed in regard to this requirement. The Technical Specifications were modeled after the Westinghouse Standard Technical Specifications, NUREG-0452, Draft Revision 5. These specifications do not specify temperatures, levels or pressures required for operability of the CCW system. Similarly, the Improved Standard Technical Specifications developed in NUREG-1431 do not include specific design values in the CCW system Technical Specification. Clearly, prior to the identification of the issues specified in GL 96-06, certain parameters such as temperature and level needed to be maintained within certain ranges to maintain the CCW system operable. Based on the manner in which the Technical Specifications have been developed, it would be inconsistent to specify design values within the CCW system Technical Specification to address safety concerns associated with Generic Letter 96-06. Accordingly, no changes to the plant's Technical Specifications are proposed or suggested.

6. **Implementing measures to assure that waterhammer will not occur, such as establishing and maintaining system overpressure requirements, is an acceptable approach for addressing the waterhammer concern. However, all scenarios must be considered to assure that the vulnerability to waterhammer has been eliminated. Confirm that all scenarios have been considered, including those where the affected containment penetrations are not isolated (if this is a possibility), such that the measures that have been established (or will be established) are adequate to prevent the occurrence of waterhammer during (and following) all postulated accident scenarios.**

FPL Response

System over-pressure is used to address the waterhammer concern. The CCW System is a closed loop cooling system which serves the containment coolers. New head tanks are being installed as an extension of the existing system surge tanks. The new head tanks have been designed to maintain the containment coolers

subcooled during a postulated worst case large break LOCA/LOOP event. This event has been confirmed to be bounding over all other accident scenarios with respect to possible containment cooler voiding. The new head tanks are passive, by design, and do not require any active components to support their function. It is not possible to automatically or remotely isolate the head tanks from the CCW Systems. Additionally, there is no reliance on containment penetrations to close. The head tanks have been designed to prevent voiding under all accident scenarios.

7. **Confirm that the waterhammer and two-phase flow analyses includes a complete failure modes and effect analysis (FMEA) for all components (including electrical and pneumatic failures) that could impact performance of the cooling water system and confirm that the FMEA is documented and available for review, or explain why a complete and fully documented FMEA was not performed.**

FPL Response

No waterhammer and two-phase flow analyses are required for the final resolution to GL 96-06. However, a complete FMEA was performed as part of the engineering design package prepared for the installation of the new head tanks. The FMEA concluded that there are no credible failure mechanisms that would prevent the head tanks from performing their design function.

8. **Determine the uncertainty in the waterhammer and two-phase flow analyses, explain how the uncertainty was determined, and how it was accounted for in the analysis to assure conservative results.**

FPL Response

No waterhammer or two-phase flow analyses were required for the final resolution to GL 96-06. In regard to the design of the new head tanks, the maximum containment cooler water temperature was determined based on conservative methodologies. The static pressure applied to the containment air coolers (via the head tank) was determined based on assuming the water column reached 200°F. The instrument uncertainty was determined based on the intent of Instrument Society of America Standard 67.04.

9. **Provide a simplified diagram of the affected system, showing major components, active components, relative elevations, lengths of piping runs, and the location of any orifices and flow restrictions**

FPL Response

A diagram is provided as Attachment 2.

10. **Describe in detail any plant modification or procedure changes that have been made or are planned to be made to resolve the waterhammer and two-phase flow issues, including schedules for any changes that have not been completed.**

FPL Response

Turkey Point is in the process of completing modifications to resolve the waterhammer and two-phase flow issues identified by GL 96-06. The modifications are now complete on Unit 4, and are being implemented on Unit 3, to complete by the end of the Fall 1998 refueling outage.

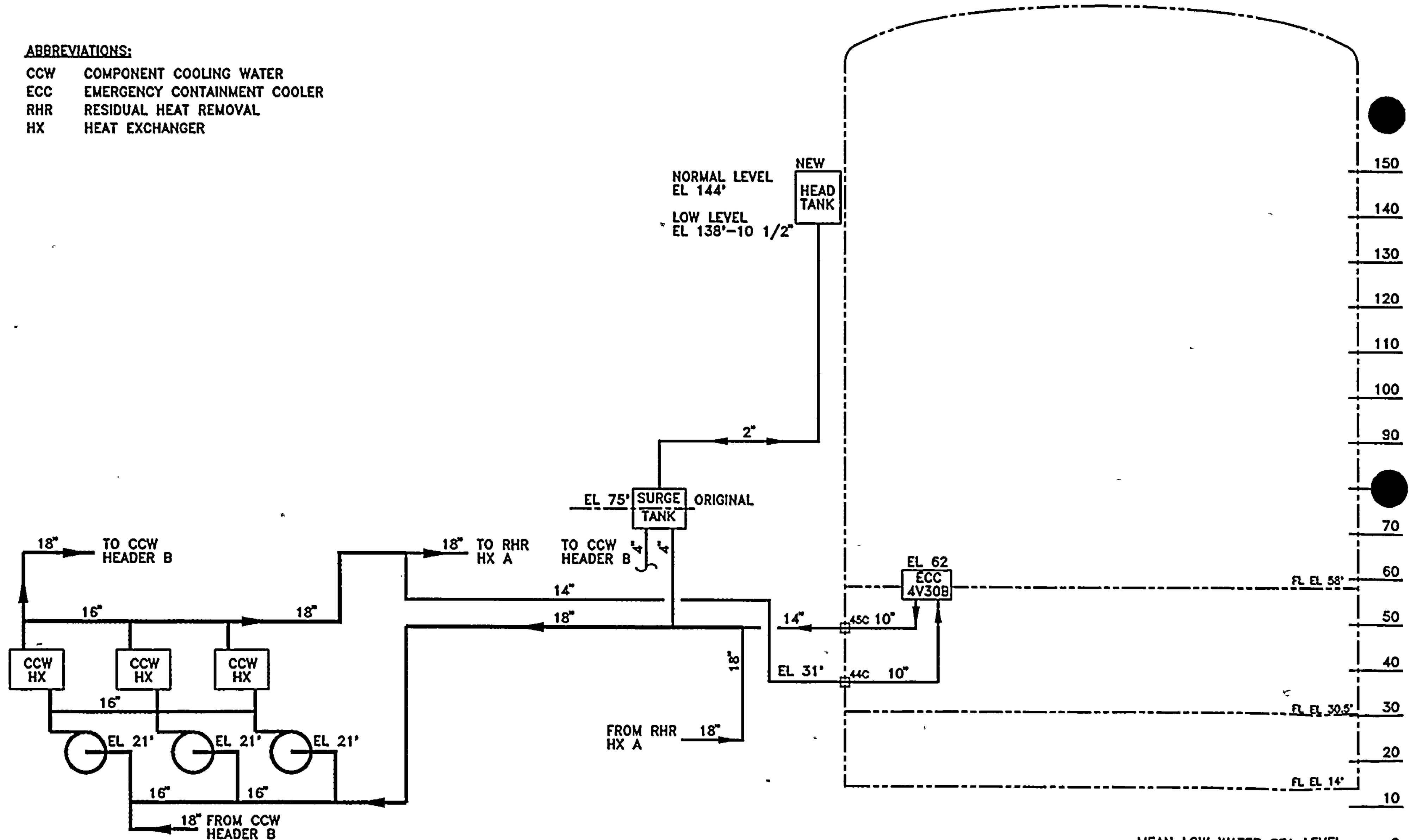
The modifications consist of the installation of new safety-related head tanks to passively maintain the containment air coolers subcooled during a postulated worst case LOOP/LOCA event. The new head tanks have been seismically mounted on the side of the containment structures at an elevation of 138' - 3" (bottom of tank). The Unit 3 Emergency Containment Cooler (ECC) 3CV30A is the high point cooler at an elevation of 73 feet (73.5 feet is used for conservatism). The elevation of the head tank is based on achieving a minimum of 27.1 psig static pressure in this cooler in the event that stagnant conditions exist as postulated for the event of concern. For conservatism, the pressure resulting from the head tank static water column outside containment was based on a saturated water density at 200°F (expected < 100°F). A detailed review of all affected components was performed to ensure that this increase in pressure was acceptable. As a result of the study, several relief valve set point changes were revised and the excess letdown heat exchangers were rerated. The surge tank relief was designed with the lowest system setpoint to ensure that no other relief valves located inside containment would lift prior to this relief valve. This feature ensures that the CCW System will not drain during a postulated over-pressurization event assuming that the relief valve does not reseat.

The new head tanks can be considered an extension of the original surge tanks. The head tanks were tied to the existing surge tanks via the original surge tanks' vent line. Piping to this vent line now extends from the surge tank to the new head tank. The new head tank vent ties back into the original vent line which extends to the waste holdup tank. This line includes a control valve that was originally designed to isolate on high activity. The logic of this valve was changed to also include closure on high level to reduce the possibility of overfilling the tank during filling operations. The new head tanks have been designed with the same operating band volume as the original surge tanks and with independent instrumentation equivalent to the existing surge tank instrumentation. Appropriate control room annunciation has been provided.

TURKEY POINT CONTAINMENT COOLER CONFIGURATION
HEADER A SCHEMATIC

ABBREVIATIONS:

CCW COMPONENT COOLING WATER
ECC EMERGENCY CONTAINMENT COOLER
RHR RESIDUAL HEAT REMOVAL
HX HEAT EXCHANGER



TURKEY POINT CONTAINMENT COOLER CONFIGURATION
HEADER B SCHEMATIC

ABBREVIATIONS:

CCW	COMPONENT COOLING WATER
ECC	EMERGENCY CONTAINMENT COOLER
CRDC	CONTROL ROD DRIVE COOLER
NCC	NORMAL CONTAINMENT COOLER
HX	HEAT EXCHANGER
RHR	RESIDUAL HEAT REMOVAL
RCP	REACTOR COOLANT PUMP