PLANT SYSTEMS

3/4.7.5 STANDBY NUCLEAR SERVICE WATER POND

LIMITING CONDITION FOR OPERATION

3.7.5 The standby nuclear service water pond (SNSWP) shall be OPERABLE with:

a. A minimum water level at or above elevation 570 feet Mean Sea Level, USGS datum, and

b. An average water temperature of less than or equal to ~~86.5°F~~ 91.5°F at elevation ~~540~~ 568 feet in the SNSWP ~~intake structure.~~

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION: (Units 1 and 2)

With the requirements of the above specification not satisfied, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.5 The SNSWP shall be determined OPERABLE:

a. At least once per 24 hours by verifying the water level to be within its limit,

b. At least once per 24 hours during the months of July, August, and September by verifying the water temperature to be within its limit,

c. At least once per 12 months by visually inspecting the SNSWP dam and verifying no abnormal degradation, erosion, or excessive seepage, and

d. At least once per 24 hours during the months of July, August and September while the Nuclear Service Water System is aligned to Lake Wylie by recording the water temperature of Lake Wylie, as measured in the discharge path of an operating Nuclear Service Water pump.

3/4.7.5 STANDBY NUCLEAR SERVICE WATER POND

The limitations on the standby nuclear service water pond (SNSWP) level and temperature ensure that sufficient cooling capacity is available to either: (1) provide normal cooldown of the facility, or (2) mitigate the effects of accident conditions within acceptable limits.

The limitations on minimum water level and maximum temperature are based on providing a 30-day cooling water supply to safety-related equipment without exceeding its design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants," March 1974.

The peak containment pressure analysis assumes that the Nuclear Service Water (RN) flow to the Containment Spray and Component Cooling heat exchangers has a temperature of ~~86.5°F.~~ This temperature is important in that it, in part, determines the capacity for energy removal from containment. The peak containment pressure occurs when energy addition to containment (core decay heat) is balanced by energy removal from these heat exchangers. This balance is reached far out in time, after the transition from injection to cold leg recirculation and after ice melt. Because of the effectiveness of the ice bed in condensing the steam which passes through it, containment pressure is insensitive to small variations in containment spray temperature prior to ice meltout.

To ensure that the RN temperature assumptions are met, Lake Wylie temperature is monitored. During periods of time while Lake Wylie temperature is greater than ~~86.5°F~~, the emergency procedure for transfer of ECCS flow paths to cold leg recirculation directs the operator to align at least one train of containment spray to be cooled by a loop of Nuclear Service Water which is aligned to the SNSWP.

3/4.7.6 CONTROL ROOM AREA VENTILATION SYSTEM

The OPERABILITY of the Control Room Area Ventilation System ensures that: (1) the ambient air temperature does not exceed the allowable temperature for continuous-duty rating for the equipment and instrumentation cooled by this system, and (2) the control room will remain habitable for operations personnel during and following all credible accident conditions. Operation of the system with the heaters operating to maintain low humidity using automatic control for at least 10 continuous hours in a 31-day period is sufficient to reduce the buildup of moisture on the adsorbers and HEPA filters. The Control Room Area Ventilation System filter units have no bypass line. Either Control Room Area Ventilation System train must operate in the filtered mode continuously. When a train is in operation, its associated heater also runs continuously. The OPERABILITY of this system in conjunction with control room design provisions is based on limiting the radiation exposure to personnel occupying the control room to 5 rems or less whole body, or its equivalent. This limitation is consistent with the requirements of General Design Criterion 19 of Appendix A, 10 CFR Part 50. ANSI N510-1980 will be used as a procedural guide for surveillance testing.

Insert 1

92°F. To ensure that this condition is not exceeded, and to ensure that long term RN temperature does not exceed the 100°F design basis of RN components (including a 2.4°F margin described in Section 2.4.4.2 of the Catawba SER, Supplements 1 and 2) a TS limit of 91.5°F is conservatively observed for the SNSWP.

Insert 2

Long term equipment qualification of safety related components required to mitigate the accident is based on a continuous, maximum RN supply temperature of 100°F.

Insert 3

Swapover to the SNSWP is required at 92°F rather than 91.5°F because Lake Wylie is not subject to subsequent heatup due to recirculation, as is the SNSWP; hence the 100°F design basis maximum temperature is not approached.

Attachment II

Proposed Technical Specification Revision

This proposed Technical Specification (TS) revision changes TS 3.7.5.b to read "An average water temperature of less than or equal to ~~92.0°F~~ 91.5°F at an elevation of ~~563~~ 568 feet in the Standby Nuclear Service Water Pond (SNSWP)." In this Technical Specification, Bases and supporting justification, the apparent discrepancy between the initial temperature of 92°F in the peak accident pressure analysis and the 91.5°F limit proposed for maximum SNSWP temperature is a result of an adjustment that has been made to account for historical differences between the Duke and NRC SNSWP models as discussed in the Catawba SER supplements 1 and 2 Section 2.4.4.2. The TS Bases are revised to reflect this change.

Discussion

Duke Power has determined that TS 3.7.5 is non-conservative in ensuring that the Standby Nuclear Service Water Pond (SNSWP) can meet its Design Basis safety function, which is to provide an adequate source of cooling water to dissipate waste heat rejected during a unit LOCA plus a unit cooldown.

In the event of a seismic event which caused the loss of Lake Wylie, the SNSWP would be the ultimate heat sink for the station. The existing TS requires that the SNSWP temperature be monitored at the bottom of SNSWP at the center line elevation of the Nuclear Service Water System (RN) SNSWP intake pipe (540 feet). Because this monitoring point is at the bottom of the SNSWP there is the opportunity for warmer water, which is less dense, to exist above the monitoring point. The assumed initial Nuclear Service Water (RN) System temperature in the FSAR peak containment pressure analysis ~~SNSWP is 86.53°F (FSAR Figure 9.2.5-3)~~ is 92°F (FSAR Section 6.2.1.1.3). To ensure that long term RN temperature does not exceed the 100°F design basis of RN components (including a 2.4°F margin described in Section 2.4.4.2 of the Catawba SER Supplements 1 and 2), a TS limit of 91.5°F is conservatively observed for the SNSWP. Since the entire pond is assumed to be at the same initial temperature, with no stratification, it is not conservative to do the surveillance for maximum allowed SNSWP temperature at the intake level. At the present time Duke Power is observing the existing Technical Specification requirements. Additionally, manual temperature readings are being taken at a higher elevation to ensure continued operability of the SNSWP until the proposed Technical Specification changes are approved.

Analysis of the ~~92°F~~ 91.5°F initial SNSWP temperature involved updating the computer analysis of the SNSWP (FSAR Figure 9-55). The updated analysis assumes an initial mixed pond temperature of ~~92°F~~ 91.5°F instead of the previously assumed temperature of 86.53°F. Although temperatures in excess of 86.53°F ~~has~~ have never been ~~exceeded~~ measured in the SNSWP, this assumption is based solely on meteorological heat input to the SNSWP, and does not necessarily allow for heat loading which could result from

extreme meteorology combined with plant operations. Results of the analysis indicate that monitoring for a maximum temperature of ~~92°F~~ 91.5°F at elevation ~~563~~ 568 feet Mean Sea Level (MSL) in the SNSWP will provide the volume of cooling water at or below ~~92°F~~ 91.5°F which will allow the design basis of the SNSWP to be met (FSAR Section 9.2.5.1). 568 feet is considered to be the highest elevation at which an average pond temperature can be attained without substantial surface heating and cooling effects due to daily variation in air temperature, rainfall, and solar heat input. Thus it is considered to be a "surface" temperature monitoring point.

Technical Justification

An extensive design analysis was completed in order to qualify the SNSWP temperature analysis for ~~a more conservative~~ the new initial temperature and evaluate its impact on station structures, systems, and equipment.

The first step in the analysis was to evaluate the physical characteristics of the SNSWP. An Area/Volume survey of the SNSWP was completed, which determined that existing FSAR data and SNSWP model inputs remain valid. Several temperature surveys of the SNSWP were performed ~~during~~ throughout 1989 and 1990, including more frequent monitoring during the summer months. These temperature surveys characterize SNSWP temperature during the time of year most likely to challenge TS temperature restrictions. 92°F was chosen as a maximum SNSWP temperature, this temperature was considered conservative both from the standpoint of plant operation and meteorological conditions. Resulting Westinghouse peak containment pressure analysis was successful at an initial SNSWP temperature of 92°F, as described below, and the heat input to the SNSWP analytical model resulted in a peak SNSWP intake temperature of less than 100°F. However, this peak temperature did not allow for the NRC pond analytical model discrepancy of 2.4°F as documented in the Catawba SER. Further discussions have been held with the NRC, and several model revisions were made to remove conservative heat input assumptions in an unsuccessful attempt to demonstrate that a 2.4°F margin exists between the predicted SNSWP peak temperature and the 100°F design basis of the safety related components. Therefore it has been decided to conservatively limit the SNSWP initial temperature to 91.5°F rather than 92°F. This results in a predicted peak intake temperature of 97.5°F thus preserving the 2.4°F margin. Since the current FSAR analysis assumes that the entire SNSWP is at the same temperature, to remain consistent with existing FSAR analysis, no credit is taken for stratification.

Westinghouse was contracted to perform a containment analysis using an initial SNSWP temperature of 92°F. Two inputs were changed in the Westinghouse analysis. The initial temperature of the SNSWP was changed from 86.5°F to 92°F, and the assumed temperature of the Refueling Water Storage Tank was changed from 120°F to 105°F. The use of the 105°F temperature for the Refueling Water Storage Tank is based on TS required temperatures of:

1) a minimum of 70°F and a maximum of 100°F in modes 1 through 4, and

2) a minimum of 70°F in modes 5 and 6.

The resulting peak analyzed pressure is 14.05 psig. Since 14.05 psig is below the 14.7 psig assumed containment peak design pressure, the results were acceptable.

The maximum time necessary from start of the LOCA until containment peak pressure is reached and pressure reduction is underway is conservatively 12.5 hours. The assumed water temperature during the first 12.5 hours is 92°F. The volume of water needed to supply the RN system for 12.5 hours is available below the ~~563~~ 557 feet elevation. This volume of water was determined using RN System demand for 12.5 hours with all four RN pumps and all four trains of essential components running for the first 4 hours and 2 trains thereafter, ~~assuming FSAR Section 9.2.5 methodology This assumption makes the selection of the 563 feet definition for SNSWP operability more conservative than in which it is postulated that two trains of emergency diesel generators and associated train components are shut off after four hours.~~ This is consistent with the methodology in Section 9.2.5 of the FSAR which assumes that two trains of emergency diesel generators and associated train components are shut down after four hours.

Assuming an initial, unstratified temperature of 91.5°F, following the initial turnover of the SNSWP volume through the RN System, the predicted peak SNSWP temperature is equal to ~~100°F~~ 97.5°F. All safety related components and assured makeup demands were previously designed for a maximum of 100°F. Thus, the 2.4°F margin between the Duke analytical model and the independent pond analysis performed by the NRC is still preserved.

The analysis which identifies ~~92°F~~ 91.5°F at elevation ~~563~~ 568 as a criterion for judging acceptable SNSWP cooling function is conservative in several ways. First, the SNSWP would be stratified under warm-weather conditions associated with worst-case meteorology, unless unusual pumping operations had resulted in mixing of the pond. Therefore, water below elevation ~~563~~ 568 would be at a temperature lower than the assumed ~~92°F~~ 91.5°F due to density stability associated with thermal stratification. Second, the ~~92°F~~ 91.5°F assumed temperature significantly exceeds the maximum expected equilibrium temperature which would result from extreme meteorology. Third, the highest measured water temperatures experienced in the Catawba SNSWP under warm weather conditions gave a surface temperature of approximately ~~82°F in 1986~~ 85°F in June 1990. Under these conditions, the pond was stratified, with a temperature of 84°F at elevation 568 feet, and water temperature declining to a low of ~~74°F~~ 61°F at the pond bottom. Therefore, the heat content was much lower than that corresponding to assumed isothermal conditions at either 86.53°F or ~~92°F~~ 91.5°F. Fourth, the total volume of water below the 568 feet elevation corresponds to the RN System demand for 12.5 hours under accident flow conditions as described in FSAR Section 9.2.5, and summarized above, plus sufficient margin to allow for possible entrainment of water from above the RN intake structure. In

addition, it will allow for daily fluctuation in the top 2 to 3 feet above 568 feet elevation without adversely affecting peak containment pressure analysis or long term equipment qualification. ~~volume of water which would be circulated through the RN System under the maximum flow assumption described above is accounted for below the 560 feet elevation. The additional three feet of water also required to be at 92°F, allows for possible entrainment of water from above the RN intake~~.

~~New~~ Test Acceptance Criteria for the major RN System heat exchangers have been issued to ensure that heat exchanger cleanliness is maintained adequately for LOCA heat rejection at the rates calculated in the corresponding Westinghouse containment peak pressure analysis. Appropriate margin is maintained to account for fouling between performance tests and/or cleaning.

Equipment Qualification analyses for long-term containment temperature have been revised conservatively to account for 92°F initial SNSWP temperature followed by 100°F RN cooling water temperature. The results have been evaluated and found to be acceptable.

Based on the results of the Design analysis described above the requirements for operability of the SNSWP are as follows:

1) Water at elevation ~~563~~ 568 feet and below must be at a temperature less than or equal to ~~92°F~~ 91.5°F.

2) Maximum water temperature for the SNSWP must remain below 100°F including at least the 2.4°F margin described in Section 2.4.4.2 of the Catawba SER, Supplements 1 and 2.

3) Normal RN intake temperature from Lake Wylie is monitored. During periods of time when Lake Wylie temperature is greater than 92°F, the emergency procedure for ECCS flow paths to cold leg recirculation requires that the operator align at least one train of containment spray to be cooled by a train of RN which is aligned to the SNSWP.

The analysis described above demonstrates continued operability of the SNSWP as long as these operability requirements are met.

No Significant Hazards Analysis

10 CFR 50.92 states that a proposed amendment involves no significant hazards consideration if operation 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 the margin of safety.

This proposed TS amendment will not have a significant increase in the probability or consequences of an accident previously evaluated. The probability of an accident will not be increased because the SNSWP does not play a role in the initiation of any accident sequence. There will not be an increase in the consequences of an accident because monitoring the SNSWP
temperature at the ~~563~~ 568 feet elevation will ensure that a sufficient volume of water is maintained at or below the required temperature to meet the design bases of the SNSWP. The volume of water below the ~~563~~ 568 elevation corresponds to the RN System demand for 12.5 hours ~~using~~, assuming all four RN pumps, all four trains of essential components, plus sufficient water at or below ~~92°F~~ 91.5°F to allow for possible hydraulic entrainment of water elevations above the RN intake. At 12.5 hours containment peak pressure will have been reached and pressure reduction will be under way. Since temperature stratification will occur, and temperatures at lower depths will be lower, monitoring the temperature at this point is conservative compared to the existing monitoring point at the SNSWP intake, which monitors cool water at the bottom of the SNSWP with the possibility of warmer water existing above. Changing the initial temperature of the ~~SNSWP~~ Nuclear Service Water (RN) supply to 92°F has been determined to have acceptable results. The Containment peak pressure analysis was performed by Westinghouse, and the resulting peak analyzed pressure was 14.05 psig, which is below the 14.7 psig assumed containment peak design pressure. All equipment has been verified to be able to function assuming the higher SNSWP initial temperatures, and essential heat exchanger cleanliness factors have been revised to account for higher initial SNSWP temperatures.

This proposed TS amendment will not create the possibility of a new or different kind of accident from any previously evaluated. The needed analysis has been completed to ensure that the design bases of the SNSWP can still be met with SNSWP temperature at ~~92°F~~ 91.5°F monitored at the ~~563~~ 568 feet elevation. All essential equipment will function as needed assuming a higher initial water temperature. The test acceptance criteria for major RN heat exchangers have been revised to ensure adequate LOCA heat rejection at the rates calculated in corresponding Westinghouse containment peak pressure analysis. Since all initial design inputs have been verified to be correct, and all other requirements relative to the SNSWP remain the same, this proposed amendment will not create the possibility of a new or different accident from any previously evaluated. In order to further reduce heat inputs to the SNSWP, the fuel pool cooling heat exchangers on the non-LOCA unit will now be isolated in addition to the previous automatic isolation of Fuel Pool Cooling to the LOCA unit. Since the Fuel Handling Building, including the pool, structure, liner plate, and HVAC have been designed for heatup and subsequent boiling conditions, this does not represent the possibility of a new or different accident from any previously evaluated.

This proposed TS amendment will not involve a significant reduction in the margin of safety. Measuring SNSWP temperature at ~~563~~ 568 feet is more conservative than measuring the temperature at the SNSWP intake structure. Measuring SNSWP temperature at the intake structure allows warmer, less dense water to exist at higher elevations. Taking the temperature measurement at ~~563~~ 568 feet ensures that a sufficient volume of water is at ~~92°F~~ 91.5°F to supply the RN system demand for 12.5 hours during a design bases accident including significant margin for possible entrainment of water elevations above the RN intake. This is the maximum time necessary from the start of a LOCA until containment peak pressure is reached and pressure reduction is under way. Since automatic swapover to the SNSWP no longer occurs on Sp, the temperature of Lake Wylie supply water will be measured at the RN Pump discharge to ensure procedural steps are followed for temperatures in excess of 92°F. Performance of appropriate system equipment has been analyzed for an initial temperature of 92°F. Peak SNSWP temperature never exceeds 100°F (including a margin of at least 2.4°F), which is the temperature that all safety related components and assured makeups were designed for. Equipment qualification and long term containment temperature have been revised to account for 92°F initial SNSWP temperature followed by 100°F RN cooling water temperature. The results have been evaluated and found to be acceptable. For these reasons this proposed TS amendment will not involve a significant reduction in the margin of safety.

Environmental Impact Statement

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

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