ATTACHMENT 1

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION

PROPOSED REVISION TO THE TECHNICAL SPECIFICATION

INFORMATION ONLY

LIMITING CONDITION FOR OPERATION

3.6.1.5 Primary containment average air temperature shall be maintained:

a. Between 75* and 100°F in the containment upper compartment, and

b. Between 100* and 120°F*** in the containment lower compartment.

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

ACTION:

With the containment average air temperature not conforming to the above limits, restore the air temperature to within the limits within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.5.1 The primary containment upper compartment average air temperature shall be the weighted average** of ambient air temperature monitoring stations located in the upper compartment. Temperature readings will be obtained at least once per 24 hours from the elevation of 826 feet at the inlet of each upper containment ventilation unit.

4.6.1.5.2 The primary containment lower compartment average air temperature shall be the weighted average** of ambient air temperature monitoring stations located in the lower compartment. Temperature readings will be obtained at least once per 24 hours from the elevation of 745 feet at the inlet of each lower containment ventilation unit.

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*Lower limit may be reduced to 60°F in MODES 2, 3, and 4.

*** **The weighted average is the sum of each temperature multiplied by its respective containment volume fraction. In the event of inoperative temperature sensor(s), the weighted average shall be taken as the reduced total divided by one minus the volume fraction represented by the sensor(s) out of service.

** ***Containment lower compartment temperature may be between 120 and 125°F for up to 90 cumulative days per calendar year provided the lower compartment temperature average over the previous 365 days is less than 120°F. ⊗ Add Page "A" Here

Within this 90 cumulative day period, Containment Lower Compartment temperature may be between 125° and 135°F for 72 cumulative hours.

AIR TEMPERATURE

INFORMATION ONLY

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CONTAINMENT SYSTEMS

AIR TEMPERATURE

LIMITING CONDITION FOR OPERATION

3.6.1.5 Primary containment average air temperature shall be maintained:

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b. Between 100* and 120°F** in the containment lower compartment.

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

ACTION:

With the containment average air temperature not conforming to the above limits, restore the air temperature to within the limits within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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ATTACHMENT 2

Description of Proposed Change, Justification, and Safety Analysis

Proposed Change:

System Description:

The purpose of the Containment Lower Compartment Ventilation (VL) System is to provide cooling to the lower compartment of Containment during normal operation and shutdown. The VL System receives 1E power and operates during events that do not result in a containment isolation signal. Operation of the VL System avoids a rise in Containment pressure such that the Containment Spray System is unnecessarily actuated. The VL System consists of four main air handling units per unit with cooling coils supplied by nuclear service water and several booster fans that assist in directing flow to the desired areas.

Proposed Change Summary

The proposed change will allow continued unit operation at elevated Containment Lower Compartment temperatures for a period not to exceed 72 cumulative hours. The proposed change will permit additional time for minor repairs should the unit experience a VL Air Handling Unit failure during the critical time of high cooling water temperature combined with maximum heat exchanger fouling during each Fall season. Performing these repairs while the Unit is on-line will avoid a forced shutdown and the resulting transient. The allowable window of 72 hours at the maximum temperature of 135°F will have minimal impact on the environmental qualification analysis.

Brief Description for Reason of Change:

Cooling water from Lake Norman, via the Low Level Intake (LLI) and the Nuclear Service Water System is the source of the VL Air Handling Unit (AHU) cooling water. During the months of late summer and early fall, the lake water experiences steadily increasing temperature along with increased fouling conditions.

Toward the end of this period, a phenomenon known as "lake turnover" occurs, in which during a short period (2-3 weeks), a rapid increase in service water temperature is experienced. This is followed by a rapid decrease in service water temperature.

During times of increased cooling water temperature and fouling, the Technical Specification limit of 120°F (but less than 125°F) is typically exceeded for a period less than 10 days. During this narrow window of time, if one of the VL System AHUs were to fail, the Containment Lower Compartment temperature would increase approximately 10°F,

resulting in a weighted average temperature between 130° and 135°F. This currently would result in exceeding the stated Technical Specification temperature limit, thereby forcing the Units to COLD SHUTDOWN. As noted below, limited operation between 125°F and 135°F will not significantly affect the accident profile. With these limits in place, the units will not be unnecessarily subjected to a unit shutdown. The proposed change would also permit any necessary/desired on-line maintenance to be performed on ventilation equipment without risk of forced shutdown.

JUSTIFICATION:

The potential impact of the proposed change has been evaluated for equipment located in lower containment. The proposed increase is not significant with respect to the peak Lower Containment ambient temperatures for the Loss of Coolant Accident/Main Steam Line Break profiles. Any effect would be limited to component aging and service life.

The service life for components in lower containment is established using the design temperature of 120°F. The effect of the proposed change has been evaluated using historical containment temperature data to demonstrate that the aggregate effect of temperature excursions above the nominal design value would not have reduced the service life of the components. The data used for this analysis consisted of a seasonal cycle with extended on-line time/limited outage time and is considered typical of expected future performance. This provides assurance that environmentally qualified equipment installed/maintained in accordance with the requirements of 10CFR50.49 will not be adversely affected. This is done by verifying that the "effective" temperature is maintained below the design value.

The value for "effective" temperature can be determined as a Degradation Weighted Average temperature using the Arrhenius methodology. This method captures the non linear relationship between temperature and the rate at which materials degrade, providing a more representative temperature value than the linear average. Mathematically, the computation is expressed as:

$$T_e = -\frac{\phi}{k}\left[\ln\left(\frac{1}{t_s}\sum_{i=1}^{n} t_i e^{-\frac{\phi}{kT_i}}\right)\right]^{-1}$$

T_e = The Degradation Weighted Average Temperature

ϕ = The material activation energy

k = Boltzmann's constant

t_s = Total service time

t_i = Time at service condition

T_i = Temperature at service condition

The value to be used for activation energy is 0.5eV. This value is accepted as a reasonable bounding value (REF.- EPRI Equipment Qualification Reference Manual) and is typical of Polyimide which is used in Valcor solenoid valves.

This evaluation shows that limited high temperature excursions do not significantly affect the effective average and that the design temperature of 120°F is maintained with adequate margin.

The proposed amendment will impact Section 6.2 of the McGuire Nuclear Station Updated Final Safety Report (UFSAR). The current UFSAR assumes an initial temperature of 125°F. This section is currently scheduled to be updated with the methodology approved in the DPC-NE-3004-P topical report. The revised Peak Containment Temperature Transient will assume 135°F as an initial temperature.

SAFETY ANALYSIS:

The proposed amendment increases the maximum initial Containment Lower Compartment temperature from 125°F to 135°F. This decreases the amount of energy transferred into the passive heat structures following a postulated high energy line break (HELB) with the lower containment atmosphere at the maximum temperature, due to the decreased temperature difference. It has the additional effect of decreasing the initial air mass, given that the lower containment environment is at the same pressure (0.3 psig maximum) and relative humidity.

All transients in Section 6.2 of the UFSAR have been evaluated to determine the effect of raising the initial Containment Lower Compartment temperature from 125°F to 135°F. The decreased temperature difference and decreased initial air mass determine if this increase results in more conser tive results, in which case no further action is required, or if the temperature increase adversely impacts the safety margins.

Peak Containment Temperature Transient:

The limiting peak containment temperature transient for McGuire is the steam line break accident. An increase in initial Containment Lower Compartment temperature will impact the peak containment temperature following a steam line break due to the reduced energy transfer to the passive heat structures in lower containment. Lower

temperature differences between these structures and the containment atmosphere result in reduced condensation of steam on the surfaces of these structures, increasing pressures and temperatures in lower containment.

Topical Report DPC-NE-3004-P (developed by Duke Power Company for the McGuire and Catawba Nuclear Stations) describes the methodology for simulating the mass and energy release from HELBs and the resulting containment response. The mass and energy release resulting from a steam line break is simulated with the RETRAN-02 MOD5.1DKE computer code for a spectrum of break sizes. The ice condenser containment response is simulated with the GOTHIC 4.0/DUKE computer code. These methods are used to demonstrate that the containment peak temperature limits, which are dictated by environmental qualification limits, are not exceeded. This methodology has been approved by the NRC for use in predicting the containment response to design basis accidents for the McGuire and Catawba Nuclear Stations.

Several runs were performed with the GOTHIC code to simulate the containment response following a main steam line break. Conservatively high values for the containment initial conditions were assumed. These included the following:

Containment pressure	=	0.3 psig;
Upper containment temperature	=	100° F;
Ice condenser initial temperature	=	30° F.

The initial ice mass value has no impact on a steam line break analysis, as the affected steam generator will be depressurized long before any individual ice bays in the ice condenser are melted. The ice heat transfer inputs are identical to those described in Topical Report DPC-NE-3004-P.

The GOTHIC analyses show that the highest break compartment temperature and lower containment average temperatures result from a 2.4 ft^2 rupture of the main steam line. The compartment temperature following a steam line break of this size is 316°F with an initial temperature of 120°F. The peak lower containment average temperature for this case is 302°F. Both of these values are below the environment qualification (EQ) requirement of 340°F for McGuire. When the initial Containment Lower Compartment temperature is increased to 135°F, the maximum break compartment temperature increases to 317°F. The average Containment Lower Compartment temperature is virtually unchanged, at 302°F. It is apparent that a 15°F increase in the initial Containment Lower Compartment temperature makes very little difference in the peak temperature. Since the peak temperature is driven by the quantity of superheated

steam and the degree of superheat (difference from saturation temperature), the higher initial temperature has a limited impact on the temperature response following a steam line break. The reduced air mass in lower containment due to the higher initial temperature results in a slight decrease in peak containment temperature.

Peak Pressure Transient:

For the limiting large-break LOCA, it is conservative to assume lower initial temperatures in the containment building. This is to increase the mass of air in containment, causing higher pressures following a LOCA. The peak containment pressure, which is caused by a cold leg break LOCA, is unaffected by an increase in the maximum Containment Lower Compartment temperature.

Short-Term Blowdown Peak Pressure:

Similar to the LOCA response discussed above, the short-term pressure surge immediately following a large-break LOCA is maximized by assuming a lower initial containment temperature. This maximizes the mass of air in the Reactor Building causing a higher pressure. Therefore, the calculation of this parameter, discussed in Section 6.2.1.1 (pages 6-10 to 6-13) of the McGuire UFSAR, is conservatively impacted by the proposed increased containment ambient temperature.

Minimum Containment Pressure:

The initial conditions assumed in the UFSAR minimum containment pressure analysis, performed for Emergency Core Cooling System analysis, are listed in Table 6-64 of the McGuire UFSAR. An initial temperature of 125°F was assumed. A higher initial Containment Lower Compartment temperature will impact the minimum containment pressure response. However, this proposed upper limit on Containment Lower Compartment temperature of 135°F represents an extreme condition that is not typically encountered during normal operation. Per Reference 79, listed on page 6-138 of the McGuire UFSAR, it has been determined that containment parameters assumed in the minimum containment pressure analysis need not be identical to the Limiting Conditions for Operation (LCO) as defined in the Containment Technical Specifications. It is judged that the conditions presently assumed in the minimum containment pressure analysis are representative of limiting conditions during normal full power operations.

The minimum containment pressure profile, used as an input to the LOCA analysis in Section 15.6.5 of the UFSAR, shows a pressure of about 3 psig during the reflood period (UFSAR Figure 6-101). A major deviation in containment backpressure would be necessary to cause a significant change in the LOCA evaluation, per the B&W LOCA methodology topical report, BAW-10174A. It is concluded that an increase in the initial Containment Lower Compartment temperature to 135°F would not cause a significant change in this backpressure. Therefore, no additional analyses are performed with an initial Containment Lower Compartment temperature of 135°F. The existing analysis in the McGuire UFSAR remains valid.

Peak Reverse Differential Pressure:

The peak reverse differential pressure analyses presented in the UFSAR utilize assumptions that maximize the air mass forced into the ice condenser and upper containment, while minimizing Containment Lower Compartment temperatures. Therefore, the proposed increase in the maximum Containment Lower Compartment temperature has no impact on this analysis.

Summary:

The NRC approved Duke Power Company mass and energy release and containment response methodology is utilized to reanalyze the steam line break peak containment temperature analysis. This is the only transient in Chapter 6.2 impacted by the proposed increase in the maximum Containment Lower Compartment temperature. The results of this analysis demonstrate that the applicable acceptance criteria are satisfied while maintaining the safety margin. Other UFSAR analyses concerning containment response have been evaluated for this increase. It is concluded that these UFSAR analyses remain valid.

Based upon the preceding analysis, Duke Power Company concludes that the proposed amendment will not be adverse to the health and safety of the public or company personnel.

ATTACHMENT 3

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

The following analysis is provided in accordance with 10CFR 50.92 to determine if the proposed change will involve a significant hazards consideration. This determination was made using the criteria of 10CFR 50.92 (c).

1. Does the proposed amendment involve a significant increase in the probability or consequences of any accident previously evaluated in the UFSAR?

The increase in maximum Containment Lower Compartmer temperature will not change the operation of any equipment which is important to safety. All components and instruments will continue to perform as designed in the higher temperature environment for the period that the revised Technical Specification allows. This temperature increase will not impact the ability of any component or instrument to perform its function in the event of an accident. Therefore, the probability of an accident is not impacted. The increased temperature will cause a decrease in the air mass in lower containment. This change has been evaluated for impact on containment temperature and pressure in accident conditions. The air mass change is conservative for peak containment pressure since the air mass is decreased. Maximum containment temperatures during a postulated accident are slightly increased as a result of higher initial Containment Lower Compartment temperature. The increase in peak temperature remains within the allowable values and thus does not increase the probability or consequence of an accident. The minimum containment pressure as a result of steam condensation in containment is lowered as a result of the decreased air mass in containment. Due to the conservative assumptions made in modeling containment for minimum pressure response, this change has no impact on the accident analysis.

Based on the analysis of the bounding [illegible]idents that may be impacted by increased Containment Lower Compartment temperature and the review of the effect of the increased temperature on components in lower containment, it is determined that the probability and consequence of any analyzed accident is unchanged as a result of this change.

2. Does the proposed amendment create the possibility of a new or different kind of accident not previously evaluated?

The revised maximum Containment Lower Compartment temperature will not change any systems or operations procedures except to procedurally respond should Containment Lower Compartment temperature remain elevated for a period near the revised limiting period. The response of the systems and components are unaffected by this change. All instruments are qualified for the revised service conditions and will perform in the same manner as before. Normal operation and transient response will remain unchanged. Review of previously analyzed accidents show that no new transients are created as a result of this change. Based on this review there are no new or different accidents made possible by this change.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

The amendment could potentially affect the containment system. The operation and analysis of the reactor coolant system and fuel are unaffected by this change. The maximum containment temperature is slightly increased while the maximum containment pressure is decreased. The minimum containment pressure could be slightly decreased and minimum containment temperature is unaffected. All these parameters have been reviewed and determined to be within the bounds of the current analyses due to the conservative assumptions made in these analyses. The accident transient analyses are unaffected beyond these small changes and remains acceptable in all cases. Therefore, the margin of safety is unaffected by this amendment.

Based on the above evaluation, Duke Power Company concludes that the proposed Technical Specification amendment does not involve a Significant Hazards Consideration.

ATTACHMENT 4

ENVIRONMENTAL IMPACT

The proposed Technical Specification amendment has been reviewed against the criteria of 10CFR51.22 for environmental considerations. The proposed amendment does not involve a significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, nor increase individual or cumulative occupational radiation exposure. Therefore, the proposed amendment meets the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.