Duke Power
A Duke Energy Company

Duke Power
526 South Church St. EC07H
Charlotte, NC 28202
P. O. Box 1006 EC07H
Charlotte, NC 28201-1006
(704) 382-2200 OFFICE
(704) 382-4360 FAX

M. S. Tuckman
Executive Vice President
Nuclear Generation

August 6, 2001

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

SUBJECT: Duke Energy Corporation

Catawba Nuclear Station Units 1 and 2
Docket Nos. 50-413, 50-414

McGuire Nuclear Station Units 1 and 2
Docket Nos. 50-369, 50-370

License Amendment Request Applicable to Technical Specifications Requirements for the Reactor Trip System Instrumentation, Table 3.3.1-1; Catawba Table of Contents; and Catawba Bases 3.3.1

Pursuant to 10CFR50.90, attached is a Duke Energy Corporation license amendment request (LAR) for the McGuire and Catawba Nuclear Stations Facility Operating Licenses and Technical Specifications (TS). This LAR applies to McGuire and Catawba TS 3.3.1, Table 3.3.1-1, Catawba Bases 3.3.1, and the Catawba Table of Contents. TS Table 3.3.1-1 contains requirements for the functions of the Reactor Trip System Instrumentation. The three changes proposed in this LAR are: 1) decrease the McGuire Units 1 & 2 and Catawba Unit 1 Overtemperature Delta Temperature (OTΔT) Allowable Values, and the McGuire Units 1 & 2 and Catawba Units 1 & 2 Overpower Delta Temperature (OPΔT) Allowable Values, Items 6 and 7 in Table 3.3.1-1; 2) correct a misspelled word in the Catawba TS Table of Contents; and 3) insert a missing section title header on Catawba Bases Page 3.3.1-10.

The contents of this amendment package are as follows:

- An Affidavit is included within this cover letter.

A001

- Attachments 1a and 1b provide a marked copy of the existing TS for McGuire Units 1 and 2 and Catawba Units 1 and 2, respectively. These marked copies show the proposed changes. Affected Bases pages are also included.

- Attachments 2a and 2b provide the reprinted TS pages for McGuire Units 1 and 2 and Catawba Units 1 and 2, respectively. Affected Bases pages are also included.

- Attachment 3 provides a Description of the Proposed Changes and Technical Justification.

- Pursuant to 10CFR50.92, Attachment 4 documents the determination that this LAR contains No Significant Hazards Consideration.

- Pursuant to 10CFR51.22(c)(9), Attachment 5 provides the basis for the categorical exclusion from performing an Environmental Assessment/Impact Statement.

Implementation of this LAR in the Facility Operating Licenses and Technical Specifications will not impact the McGuire and Catawba Updated Final Safety Analysis Reports (UFSAR). Duke is requesting timely NRC review and approval of this LAR, since Table 3.3.1-1 is currently non-conservative in regard to the OTΔT and OPΔT Allowable Values. It has been determined that the NRC's standard 30-day implementation period is acceptable for this LAR.

In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, the site-specific changes contained in this LAR have been reviewed and approved by the respective McGuire and Catawba Plant Operations Review Committee. This LAR has also been reviewed and approved on an overall basis by the Duke Corporate Nuclear Safety Review Board. Pursuant to 10CFR50.91, a copy of this LAR is being sent to the

designated official of the State of North Carolina and the designated official of the State of South Carolina.

Inquiries on this matter should be directed to J. S. Warren at (704) 382-4986.

Very truly yours,

M. S. Tuckman

M. S. Tuckman

Attachments

xc w/Attachments:

L. A. Reyes
U. S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

C. P. Patel
NRC Senior Project Manager (CNS)
U. S. Nuclear Regulatory Commission
Mail Stop O-8 H12
Washington, DC 20555-0001

R. E. Martin
NRC Senior Project Manager (MNS)
U. S. Nuclear Regulatory Commission
Mail Stop O-8 H12
Washington, DC 20555-0001

D. J. Roberts
Senior Resident Inspector (CNS)
U. S. Nuclear Regulatory Commission
Catawba Nuclear Site

S. M. Shaeffer
Senior Resident Inspector (MNS)
U. S. Nuclear Regulatory Commission
McGuire Nuclear Site

R. Wingard, Director
Division of Radioactive Waste Management
South Carolina Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

M. Frye
Division of Radiation Protection
3825 Barrett Drive
Raleigh, NC 27609-7221

AFFIDAVIT

M. S. Tuckman, being duly sworn, states that he is Executive Vice President of Duke Energy Corporation; that he is authorized on the part of said corporation to sign and file with the Nuclear Regulatory Commission these amendments to the McGuire Nuclear Station Facility Operating Licenses Nos. NPF-9 and NPF-17 and the Catawba Nuclear Station Facility Operating Licenses Nos. NPF-35 and NPF-52 and associated Technical Specifications; and that all statements and matters set forth herein are true and correct to the best of his knowledge.

M. S. Tuckman

M. S. Tuckman, Executive Vice President

Subscribed and sworn to on: August 6, 2001
Date

Mary P. Nelms, Notary Public

My commission expires: JAN 22, 2006

SEAL

bxc w/Attachments:

C. J. Thomas
M. R. Wilder
G. D. Gilbert
L. E. Nicholson
K. L. Crane
K. E. Nicholson
M. E. Carroll
L. J. Rudy
T. K. Pasour (2)
NRIA File/ELL
McGuire Master File - MG01DM
Catawba Master File 801.01 - CN04DM

Catawba Owners:
Saluda River Electric Corporation
P. O. Box 929
Laurens, SC 29360-0929

NC Municipal Power Agency No. 1
P. O. Box 29513
Raleigh, NC 27626-0513

T. R. Puryear
NC Electric Membership Corporation
CN03G

Piedmont Municipal Power Agency
121 Village Drive
Greer, SC 29651

Attachment 1a

McGuire Units 1 and 2 Technical Specifications

Marked Copy

Table 3.3.1-1 (page 5 of 7)
Reactor Trip System Instrumentation

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 4.4% of RTP. 4.3

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{K_1 - K_2 \frac{(1+\tau_4 s)}{(1+\tau_5 s)}\left[T \frac{1}{(1+\tau_6 s)} - T'\right] + K_3 (P - P') - f_1(\Delta I)\right\}$$

Where: ΔT is measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec-1.
T is the measured RCS average temperature, °F.
T' is the nominal Tavg at RTP, < 585.1 °F.

P is the measured pressurizer pressure, psig
P' is the nominal RCS operating pressure, = 2235 psig

K_1 = Overtemperature ΔT reactor trip NOMINAL TRIP SETPOINT, as presented in the COLR,
K_2 = Overtemperature ΔT reactor trip heatup setpoint penalty coefficient, as presented in the COLR,
K_3 = Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient, as presented in the COLR,
τ_1, τ_2 = Time constants utilized in the lead-lag controller for ΔT, as presented in the COLR,
τ_3 = Time constants utilized in the lag compensator for ΔT, as presented in the COLR,
τ_4, τ_5 = Time constants utilized in the lead-lag controller for T_{avg}, as presented in the COLR,
τ_6 = Time constants utilized in the measured T_{avg} lag compensator, as presented in the COLR, and,

$f_1(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_1(\Delta I)$ breakpoints as presented in the COLR; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(continued)

Table 3.3.1-1 (page 6 of 7)
Reactor Trip System Instrumentation

(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than the $f_1(\Delta I)$ "negative" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "negative" slope presented in the COLR; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than the $f_1(\Delta I)$ "positive" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "positive" slope presented in the COLR.

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 3.0% of RTP. 2.6

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 s}\left(\frac{1}{1+\tau_6 s}\right)T - K_6\left[T\frac{1}{1+\tau_6 s} - T'\right] - f_2(\Delta I)\right\}$$

Where: ΔT is measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T' is the nominal T_{avg} at RTP, ≤ 585.1 °F.

K_4 = Overpower ΔT reactor NOMINAL TRIP SETPOINT as presented in the COLR,
K_5 = 0.02/°F for increasing average temperature and 0 for decreasing average temperature,
K_6 = Overpower ΔT reactor trip heatup setpoint penalty coefficient as presented in the COLR for $T > T'$ and $K_6 = 0$ for $T \le T'$,
τ_1, τ_2 = Time constants utilized in the lead-lag controller for ΔT, as presented in the COLR,
τ_3 = Time constants utilized in the lag compensator for ΔT, as presented in the COLR,
τ_6 = Time constants utilized in the measured T_{avg} lag compensator, as presented in the COLR,
τ_7 = Time constant utilized in the rate-lag controller for T_{avg}, as presented in the COLR, and

$f_2(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(continued)

Attachment 1b

Catawba Units 1 and 2 Technical Specifications

Marked Copy

3.7 PLANT SYSTEMS 3.7.1-1
3.7.1 Main Steam Safety Valves (MSSVs) 3.7.1-1
3.7.2 Main Steam Isolation Valves (MSIVs) 3.7.2-1
3.7.3 Main Feedwater Isolation Valves (MFIVs), Main Feedwater Control Valves (MFCVs), Associated Bypass and Tampering Valves 3.7.3-1
3.7.4 Steam Generator Power Operated Relief Valves (SG PORVs) 3.7.4-1
3.7.5 Auxiliary Feedwater (AFW) System 3.7.5-1
3.7.6 Condensate Storage System (CSS) 3.7.6-1
3.7.7 Component Cooling Water (CCW) System 3.7.7-1
3.7.8 Nuclear Service Water System (NSWS) 3.7.8-1
3.7.9 Standby Nuclear Service Water Pond (SNSWP) 3.7.9-1
3.7.10 Control Room Area Ventilation System (CRAVS) 3.7.10-1
3.7.11 Control Room Area Chilled Water System (CRACWS) 3.7.11-1
3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES) 3.7.12-1
3.7.13 Fuel Handling Ventilation Exhaust System (FHVES) 3.7.13-1
3.7.14 Spent Fuel Pool Water Level 3.7.14-1
3.7.15 Spent Fuel Pool Boron Concentration 3.7.15-1
3.7.16 Spent Fuel Assembly Storage 3.7.16-1
3.7.17 Secondary Specific Activity 3.7.17-1

3.8 ELECTRICAL POWER SYSTEMS 3.8.1-1
3.8.1 AC Sources — Operating 3.8.1-1
3.8.2 AC Sources — Shutdown 3.8.2-1
3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air 3.8.3-1
3.8.4 DC Sources — Operating 3.8.4-1
3.8.5 DC Sources — Shutdown 3.8.5-1
3.8.6 Battery Cell Parameters 3.8.6-1
3.8.7 Inverters — Operating 3.8.7-1
3.8.8 Inverters — Shutdown 3.8.8-1
3.8.9 Distribution Systems — Operating 3.8.9-1
3.8.10 Distribution Systems — Shutdown 3.8.10-1

3.9 REFUELING OPERATIONS 3.9.1-1
3.9.1 Boron Concentration 3.9.1-1
3.9.2 Nuclear Instrumentation 3.9.2-1
3.9.3 Containment Penetrations 3.9.3-1
3.9.4 Residual Heat Removal (RHR) and Coolant Circulation — High Water Level 3.9.4-1
3.9.5 Residual Heat Removal (RHR) and Coolant Circulation — Low Water Level 3.9.5-1
3.9.6 Refueling Cavity Water Level 3.9.6-1

Table 3.3.1-1 (page 5 of 7)
Reactor Trip System Instrumentation

4.3% (Unit 1) and 4.5% (Unit 2)

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 4.5% of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{ K_1 - K_2 \frac{(1+\tau_4 s)}{(1+\tau_5 s)}\left[T \frac{1}{(1+\tau_6 s)} - T'\right] + K_3 (P - P') - f_1(\Delta I) \right\}$$

Where: ΔT is the measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T' is the nominal T_{avg} at RTP (allowed by Safety Analysis), ≤ 585.1°F (Unit 1) ≤ 590.8°F (Unit 2).
P is the measured pressurizer pressure, psig
P' is the nominal RCS operating pressure, = 2235 psig

K_1 = Overtemperature ΔT reactor NOMINAL TRIP SETPOINT, as presented in the COLR,

K_2 = Overtemperature ΔT reactor trip heatup setpoint penalty coefficient, as presented in the COLR,

K_3 = Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient, as presented in the COLR,

τ_1, τ_2 = Time constants utilized in the lead-lag compensator for ΔT, as presented in the COLR,

τ_3 = Time constant utilized in the lag compensator for ΔT, as presented in the COLR,

τ_4, τ_5 = Time constants utilized in the lead-lag compensator for T_{avg}, as presented in the COLR,

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, as presented in the COLR, and

$f_1(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_1(\Delta I)$ breakpoints as presented in the COLR; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(ii) for each percent ΔI that the magnitude of $q_t - q_b$ is more negative than the $f_1(\Delta I)$ "negative" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "negative" slope presented in the COLR; and

(continued)

Table 3.3.1-1 (page 6 of 7)
Reactor Trip System Instrumentation

(iii) for each percent ΔI that the magnitude of $q_t - q_b$ is more positive than the $f_1(\Delta I)$ "positive" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "positive" slope presented in the COLR.

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 2.6% (Unit 1) 3.3% (Unit 2) and 3.1 of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \leq \Delta T_0 \left\{K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 S}\left(\frac{1}{1+\tau_6 s}\right) T - K_6 \left[T \frac{1}{1+\tau_6 s} - T''\right] - f_2(\Delta I)\right\}$$

Where: ΔT is the measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T'' is the nominal T_{avg} at RTP (calibration temperature for ΔT instrumentation), $\leq$ 585.1°F (Unit 1) $\leq$ 590.8°F (Unit 2).

K_4 = Overpower ΔT reactor NOMINAL TRIP SETPOINT as presented in the COLR,

K_5 = 0.02/°F for increasing average temperature and 0 for decreasing average temperature,

K_6 = Overpower ΔT reactor trip heatup setpoint penalty coefficient as presented in the COLR for $T > T''$ and $K_6 = 0$ for $T \leq T''$,

τ_1, τ_2 = Time constants utilized in the lead-lag compensator for ΔT, as presented in the COLR,

τ_3 = Time constant utilized in the lag compensator for ΔT, as presented in the COLR,

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, as presented in the COLR,

τ_7 = Time constant utilized in the rate-lag controller for T_{avg}, as presented in the COLR, and

$f_2(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_2(\Delta I)$ breakpoints as presented in the COLR; $f_2(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY (continued)

against positive reactivity additions or power excursions in ~~MODE 3~~, 4, 5, or 6.

3. Power Range Neutron Flux - High Positive Rate

The Power Range ~~Neutron Flux-High Positive Rate~~ trip uses the same channels as discussed for Function 2 above.

The Power Range Neutron Flux-High Positive Rate trip Function ensures that protection is provided against rapid increases in neutron flux that are characteristic of an RCCA drive rod housing rupture and the accompanying ejection of the RCCA. This Function compliments the Power Range Neutron Flux-High and Low Setpoint trip Functions to ensure that the criteria are met for a rod ejection from the power range.

The LCO requires all four of the Power Range Neutron Flux-High Positive Rate channels to be OPERABLE.

In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a rod ejection accident (REA), the Power Range Neutron Flux—High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux-High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.

4. Intermediate Range Neutron Flux

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power

Attachment 2a

McGuire Units 1 and 2 Technical Specifications

Reprinted Pages

Remove	Insert
3.3.1-18	3.3.1-18
3.3.1-19	3.3.1-19

Table 3.3.1-1 (page 5 of 7)
Reactor Trip System Instrumentation

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 4.3% of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{K_1 - K_2 \frac{(1+\tau_4\ s)}{(1+\tau_5\ s)}\left[T \frac{1}{(1+\tau_6\ s)} - T'\right] + K_3\ (P - P') - f_1\ (\Delta I)\right\}$$

Where: ΔT is measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec-1.
T is the measured RCS average temperature, °F.
T' is the nominal Tavg at RTP, ≤ 585.1 °F.

P is the measured pressurizer pressure, psig
P' is the nominal RCS operating pressure, = 2235 psig

K_1 = Overtemperature ΔT reactor NOMINAL TRIP SETPOINT, as presented in the COLR,
K_2 = Overtemperature ΔT reactor trip heatup setpoint penalty coefficient, as presented in the COLR,
K_3 = Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient, as presented in the COLR,
τ_1, τ_2 = Time constants utilized in the lead-lag controller for ΔT, as presented in the COLR,
τ_3 = Time constants utilized in the lag compensator for ΔT, as presented in the COLR,
τ_4, τ_5 = Time constants utilized in the lead-lag controller for T_{avg}, as presented in the COLR,
τ_6 = Time constants utilized in the measured T_{avg} lag compensator, as presented in the COLR, and,

$f_1(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_1(\Delta I)$ breakpoints as presented in the COLR; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(continued)

Table 3.3.1-1 (page 6 of 7)
Reactor Trip System Instrumentation

(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than the $f_1(\Delta I)$ "negative" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "negative" slope presented in the COLR; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than the $f_1(\Delta I)$ "positive" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "positive" slope presented in the COLR.

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 2.6% of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s}\left(\frac{1}{1+\tau_3 s}\right) \leq \Delta T_0 \left\{K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 s}\left(\frac{1}{1+\tau_6 s}\right)T - K_6\left[T\frac{1}{1+\tau_6 s} - T''\right] - f_2(\Delta I)\right\}$$

Where: ΔT is measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T'' is the nominal T_{avg} at RTP, $\leq$ 585.1 °F.

K_4 = Overpower ΔT reactor NOMINAL TRIP SETPOINT as presented in the COLR,
K_5 = 0.02/°F for increasing average temperature and 0 for decreasing average temperature,
K_6 = Overpower ΔT reactor trip heatup setpoint penalty coefficient as presented in the COLR for $T > T''$ and $K_6 = 0$ for $T \leq T''$,
τ_1, τ_2 = Time constants utilized in the lead-lag controller for ΔT, as presented in the COLR,
τ_3 = Time constants utilized in the lag compensator for ΔT, as presented in the COLR,
τ_6 = Time constants utilized in the measured T_{avg} lag compensator, as presented in the COLR,
τ_7 = Time constant utilized in the rate-lag controller for T_{avg}, as presented in the COLR, and

$f_2(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(continued)

Attachment 2b

Catawba Units 1 and 2 Technical Specifications

Reprinted Pages

Remove	Insert
iii	iii
3.3.1-18	3.3.1-18
3.3.1-19	3.3.1-19
B3.3.1-10	B3.3.1-10

3.7 PLANT SYSTEMS 3.7.1-1
3.7.1 Main Steam Safety Valves (MSSVs) 3.7.1-1
3.7.2 Main Steam Isolation Valves (MSIVs) 3.7.2-1
3.7.3 Main Feedwater Isolation Valves (MFIVs), Main Feedwater Control Valves (MFCVs), Associated Bypass and Tempering Valves 3.7.3-1
3.7.4 Steam Generator Power Operated Relief Valves (SG PORVs) 3.7.4-1
3.7.5 Auxiliary Feedwater (AFW) System 3.7.5-1
3.7.6 Condensate Storage System (CSS) 3.7.6-1
3.7.7 Component Cooling Water (CCW) System 3.7.7-1
3.7.8 Nuclear Service Water System (NSWS) 3.7.8-1
3.7.9 Standby Nuclear Service Water Pond (SNSWP) 3.7.9-1
3.7.10 Control Room Area Ventilation System (CRAVS) 3.7.10-1
3.7.11 Control Room Area Chilled Water System (CRACWS) 3.7.11-1
3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES) 3.7.12-1
3.7.13 Fuel Handling Ventilation Exhaust System (FHVES) 3.7.13-1
3.7.14 Spent Fuel Pool Water Level 3.7.14-1
3.7.15 Spent Fuel Pool Boron Concentration 3.7.15-1
3.7.16 Spent Fuel Assembly Storage 3.7.16-1
3.7.17 Secondary Specific Activity 3.7.17-1

3.8 ELECTRICAL POWER SYSTEMS 3.8.1-1
3.8.1 AC Sources — Operating 3.8.1-1
3.8.2 AC Sources — Shutdown 3.8.2-1
3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air 3.8.3-1
3.8.4 DC Sources — Operating 3.8.4-1
3.8.5 DC Sources — Shutdown 3.8.5-1
3.8.6 Battery Cell Parameters 3.8.6-1
3.8.7 Inverters — Operating 3.8.7-1
3.8.8 Inverters — Shutdown 3.8.8-1
3.8.9 Distribution Systems — Operating 3.8.9-1
3.8.10 Distribution Systems — Shutdown 3.8.10-1

3.9 REFUELING OPERATIONS 3.9.1-1
3.9.1 Boron Concentration 3.9.1-1
3.9.2 Nuclear Instrumentation 3.9.2-1
3.9.3 Containment Penetrations 3.9.3-1
3.9.4 Residual Heat Removal (RHR) and Coolant Circulation — High Water Level 3.9.4-1
3.9.5 Residual Heat Removal (RHR) and Coolant Circulation — Low Water Level 3.9.5-1
3.9.6 Refueling Cavity Water Level 3.9.6-1

Table 3.3.1-1 (page 5 of 7)
Reactor Trip System Instrumentation

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 4.3% (Unit 1) and 4.5% (Unit 2) of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{ K_1 - K_2 \frac{(1+\tau_4 s)}{(1+\tau_5 s)}\left[T \frac{1}{(1+\tau_6 s)} - T' \right] + K_3 (P - P') - f_1(\Delta I) \right\}$$

Where: ΔT is the measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T' is the nominal T_{avg} at RTP (allowed by Safety Analysis), ≤ 585.1°F (Unit 1) ≤ 590.8°F (Unit 2).
P is the measured pressurizer pressure, psig
P' is the nominal RCS operating pressure, = 2235 psig

K_1 = Overtemperature ΔT reactor NOMINAL TRIP SETPOINT, as presented in the COLR,

K_2 = Overtemperature ΔT reactor trip heatup setpoint penalty coefficient, as presented in the COLR,

K_3 = Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient, as presented in the COLR,

τ_1, τ_2 = Time constants utilized in the lead-lag compensator for ΔT, as presented in the COLR,

τ_3 = Time constant utilized in the lag compensator for ΔT, as presented in the COLR,

τ_4, τ_5 = Time constants utilized in the lead-lag compensator for T_{avg}, as presented in the COLR,

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, as presented in the COLR, and

$f_1(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_1(\Delta I)$ breakpoints as presented in the COLR; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(ii) for each percent ΔI that the magnitude of $q_t - q_b$ is more negative than the $f_1(\Delta I)$ "negative" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "negative" slope presented in the COLR; and

(continued)

Table 3.3.1-1 (page 6 of 7)
Reactor Trip System Instrumentation

(iii) for each percent ΔI that the magnitude of $q_t - q_b$ is more positive than the $f_1(\Delta I)$ "positive" breakpoint presented in the COLR, the ΔT Trip Setpoint shall be automatically reduced by the $f_1(\Delta I)$ "positive" slope presented in the COLR.

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following NOMINAL TRIP SETPOINT by more than 2.6% (Unit 1) and 3.1% (Unit 2) of RTP.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 s}\left(\frac{1}{1+\tau_6 s}\right)T - K_6\left[T\frac{1}{1+\tau_6 s} - T''\right] - f_2(\Delta I)\right\}$$

Where: ΔT is the measured RCS ΔT by loop narrow range RTDs, °F.
ΔT_0 is the indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T'' is the nominal T_{avg} at RTP (calibration temperature for ΔT instrumentation), $\le$ 585.1°F (Unit 1) $\le$ 590.8°F (Unit 2).

K_4 = Overpower ΔT reactor NOMINAL TRIP SETPOINT as presented in the COLR,

K_5 = 0.02/°F for increasing average temperature and 0 for decreasing average temperature,

K_6 = Overpower ΔT reactor trip heatup setpoint penalty coefficient as presented in the COLR for $T > T''$ and $K_6 = 0$ for $T \le T''$,

τ_1, τ_2 = Time constants utilized in the lead-lag compensator for ΔT, as presented in the COLR,

τ_3 = Time constant utilized in the lag compensator for ΔT, as presented in the COLR,

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, as presented in the COLR,

τ_7 = Time constant utilized in the rate-lag controller for T_{avg}, as presented in the COLR, and

$f_2(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between the "positive" and "negative" $f_2(\Delta I)$ breakpoints as presented in the COLR; $f_2(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY (continued)

against positive reactivity additions or power excursions in MODE 3, 4, 5, or 6.

3. Power Range Neutron Flux – High Positive Rate

The Power Range Neutron Flux-High Positive Rate trip uses the same channels as discussed for Function 2 above.

The Power Range Neutron Flux-High Positive Rate trip Function ensures that protection is provided against rapid increases in neutron flux that are characteristic of an RCCA drive rod housing rupture and the accompanying ejection of the RCCA. This Function compliments the Power Range Neutron Flux-High and Low Setpoint trip Functions to ensure that the criteria are met for a rod ejection from the power range.

The LCO requires all four of the Power Range Neutron Flux-High Positive Rate channels to be OPERABLE.

In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a rod ejection accident (REA), the Power Range Neutron Flux—High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux-High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.

4. Intermediate Range Neutron Flux

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power

Attachment 3

Description of Proposed Changes and Technical Justification

DESCRIPTION OF PROPOSED CHANGES

There are three changes proposed in this license amendment request (LAR). One of the proposed changes applies to both McGuire and Catawba Technical Specifications (TS) Table 3.3.1-1, Reactor Trip System Instrumentation. The other two are administrative changes that apply only to the Catawba TS Table of Contents and Catawba Bases 3.3.1. The proposed changes contained in this LAR are described below.

1. In Table 3.3.1-1, the nominal trip setpoint notes that address allowable values are being changed for Item 6 and Item 7. It is proposed to decrease the McGuire Units 1 & 2 and the Catawba Unit 1 Overtemperature Delta Temperature (OTΔT) Allowable Values and the McGuire Units 1 & 2 and the Catawba Units 1 & 2 Overpower Delta Temperature (OPΔT) Allowable Values. The McGuire TS, Table 3.3.1-1, Allowable Values, given in Notes 1 and 2 will be decreased from 4.4% Rated Thermal Power (RTP) and 3.0% RTP to 4.3% RTP and 2.6% RTP, respectively. The Catawba TS, Table 3.3.1-1, Allowable Values, given in Notes 1 and 2 will be decreased from 4.5% RTP and 3.0% RTP to 4.3% RTP and 2.6% RTP respectively for Unit 1 only. The Catawba Unit 2 Allowable Value given in Note 1 will remain at 4.5% RTP. The Catawba Unit 2 Allowable Value given in Note 2 will be decreased to 3.1% RTP.

2. An administrative change (unrelated to the other changes contained in this LAR) is being made to Page iii of the Catawba TS Table of Contents. A misspelled word is being corrected: "Tampering" is being changed to "Tempering" in Item 3.7.3. This administrative change only applies to Catawba.

3. An administrative change (unrelated to the other changes contained in this LAR) is being made to Page 3.3.1-10 of the Catawba TS Bases. A missing section title header is being inserted. This administrative change only applies to Catawba. This administrative change adds a missing section number and title: "3. Power Range Neutron Flux-High Positive Rate."

The TS Bases are unaffected by these changes contained in this LAR, except for the administrative change described in Item 3 above. The technical justification for Changes 1 through 3, as described above, are discussed in the subsequent paragraphs.

Attachment 3

Description of Proposed Changes and Technical Justification

TECHNICAL JUSTIFICATION FOR CHANGE #1, MCGUIRE AND CATAWBA OTΔT AND OPΔT ALLOWABLE VALUES

Background

The current uncertainty analysis calculations for the OTΔT and OPΔT setpoint instrument channels include a process measurement allowance (PMA) to account for the variation in the measurement of the hot leg temperature due to the temperature gradient which may exist in the hot leg (hot leg streaming phenomenon). This temperature gradient may result in the hot leg temperature indication, as determined by averaging the three hot leg RTD indications, being slightly different from the actual bulk hot leg temperature. The present allowance of 1°F was calculated by Westinghouse and incorporated into the uncertainty analyses for ΔT and Tavg related allowances at the time of the RTD bypass removal modification. A 1°F uncertainty was calculated for the approximately 9°F temperature gradient in the hot leg at the time of the RTD bypass removal modification. Westinghouse determined the 1°F allowance from the interpretation of test data taken during hot leg temperature gradient testing performed at McGuire Unit 1.

In the interval since the temperature gradient testing, reload core designs have changed, resulting in higher core peaking and some indications of increases in the hot leg temperature gradient. Hot leg temperature gradients as large as 14 °F have been seen at both McGuire and Catawba.

Discussion

An evaluation was performed by Duke to determine if the current hot leg streaming allowance of 1°F was adequate given the increases in hot leg temperature gradients. The change in this allowance has the potential to impact several uncertainty calculations. The uncertainty analyses that have the potential to be impacted are given below:

- OTΔT
- OPΔT
- Low Tavg (Feedwater Isolation)
- Reactor Coolant Tavg (Rod Control)
- Pressurizer Level Program

Attachment 3

Description of Proposed Changes and Technical Justification

The evaluation determined that a hot leg streaming allowance of 1.21°F should be used to account for the hot leg streaming phenomenon. Historical plant data is used to directly calculate the changes in the hot leg streaming and determine a new streaming uncertainty. The plant data was used to back-calculate a hot leg temperature, which is then compared to the average of the three hot leg RTDs. The calculation is performed using plant data spanning several operating cycles (or as much data as is available), and 95/95 statistics were generated. A maximum deviation of the calculated hot leg average temperature from the indicated hot leg average temperature was determined such that a streaming uncertainty may be chosen to bound (in a 95/95 fashion) this deviation.

The uncertainty allowances for each of the above setpoints/control uncertainties contained sufficient margin to accommodate the increase in the hot leg streaming allowance. However, the OTΔT and OPΔT Allowable Values will have to be decreased to account for this increase in uncertainty.

The TS Allowable Values are bistable trip setpoints in the plant TS which allow for deviations, e.g., rack drift and/or calibration tolerances, from the nominal trip setpoint. Periodically, the instrument string must be checked to see if the actual setpoint has drifted substantially from the required setpoint. This is accomplished during calibration checks by comparing the measured setpoint to the Allowable Value listed in the TS. The difference between the required TS setpoint and the Allowable Value is the expected rack drift. Discovery that the measured setpoint has exceeded the Allowable Value indicates that the channel has experienced an excessive amount of drift and impacts the operability of the channel. The channel should then be restored to operable status in accordance with the action statements of the TS.

The increase in the hot leg streaming allowance is included in the uncertainty calculations using the Duke setpoint uncertainty methodology. The OTΔT, OPΔT, Low Tavg setpoints contain sufficient margin such that an increase in the streaming allowance will not increase the total allowance (TA) for the setpoint. With no increase in the TA applied to the setpoints used in the safety analyses, the applicable safety analyses remain bounding and valid. For the Reactor Coolant Tavg and Pressurizer Level Program, the uncertainty allowances continue to

remain bounding as the channel statistical allowance for these functions continue to be within the TA assumed in the uncertainty analyses for these control systems. The increase in the hot leg streaming allowance in the uncertainty calculations results only in a decrease in the Allowable Values for the OTΔT and OPΔT setpoints. This may result in a slight increase in the number of channel calibrations required following quarterly surveillances. However, a decrease in the Allowable Values is in the conservative direction and will not adversely affect the steady-state or transient analyses documented in Chapter 15 of the McGuire and Catawba Nuclear Station UFSARs.

A decrease in the TS Allowable Values for the OTΔT and OPΔT setpoints will not have an adverse impact on any of the accident analyses presented in Chapter 15 of the UFSARs. In addition, none of the analyses presented in Chapters 3, 4, or 6 are affected by this change. Therefore, the proposed change in the Allowable Values for the OTΔT and OPΔT setpoints will not result in a reduction of safety margin for these analyses.

Conclusion

A decrease is required for the McGuire Units 1 & 2 and Catawba Unit 1 OTΔT Allowable Values and the McGuire Units 1 & 2 and Catawba Units 1 & 2 OPΔT Allowable Values. This change is justified because a decrease in the TS OTΔT and OPΔT Allowable Values will not adversely affect the steady-state or transient analyses documented in Chapters 3, 4, 6, and 15 of the McGuire and Catawba UFSARs. The proposed change in the Allowable Values for the OTΔT and OPΔT setpoints will not result in a decrease in the margin of safety.

TECHNICAL JUSTIFICATION FOR CHANGE #2, CATAWBA TS TABLE OF CONTENTS

The correction being made to the Catawba Table of Contents is solely administrative in nature. This change merely corrects a misspelled word.

Attachment 3

Description of Proposed Changes and Technical Justification

TECHNICAL JUSTIFICATION FOR CHANGE #3, CATAWBA BASES 3.3.1

The correction being made to Catawba Bases Page 3.3.1-10 is solely administrative in nature. It was discovered that the title header for: "3. Power Range Neutron Flux-High Positive Rate," under the APPLICABLE SAFETY ANALYSES, LCO, and Applicability Section of the Bases was missing. This change merely inserts this missing title.

Attachment 4

No Significant Hazards Consideration Determination

The following discussion is a summary of the evaluation of this license amendment request (LAR) against the 10CFR50.92(c) requirements to demonstrate that all three of the stated standards are satisfied. A no significant hazards consideration is indicated if operation of the facility in accordance with the changes proposed in this LAR 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.

First Standard

Would implementation of the changes proposed in this LAR involve a significant increase in the probability or consequences of an accident previously evaluated?

No. This license amendment request proposes to decrease the McGuire Units 1 & 2 and Catawba Unit 1 Overtemperature Delta Temperature (OTΔT) Allowable Values and the McGuire Units 1 & 2 and Catawba Units 1 & 2 Overpower Delta Temperature (OPΔT) Allowable Values. This decrease is in the conservative direction and will not adversely affect the steady-state or transient analyses documented in the Updated Final Safety Analysis Reports. These changes have no impact on accident probabilities or consequences.

The proposed changes to the Catawba Table of Contents and Bases are solely administrative in nature and have no impact on any accidents.

Second Standard

Would implementation of the changes proposed in this LAR create the possibility of a new or different kind of accident from any previously evaluated?

No. The proposed changes contained in this LAR only correct administrative errors and add conservative operability requirements which are consistent with the plants' existing

licensing bases. No new or different kinds of accidents are being created.

Third Standard

Would implementation of the changes proposed in this LAR involve a significant reduction in a margin of safety?

No. Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. These barriers include the fuel cladding, the reactor coolant system, and the containment system. These barriers are unaffected by the changes proposed in this LAR. Consequently, no margin of safety will be significantly impacted by this LAR.

Conclusion

Based upon the preceding evaluation, performed pursuant to 10CFR50.92, Duke Energy Corporation has concluded that implementation of this LAR at McGuire and Catawba Nuclear Stations will not involve a significant hazards consideration. The changes proposed in this LAR make a conservative decrease in the McGuire Units 1 & 2 and Catawba Unit 1 OTΔT Allowable Values and the McGuire Units 1 & 2 and Catawba Units 1 & 2 OPΔT Allowable Values and correct unrelated administrative errors. Following implementation of these proposed changes, McGuire and Catawba will continue to be operated in a conservative manner.

Attachment 5

Environmental Assessment/Impact Statement

The proposed Technical Specifications 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 exposures. Therefore, the proposed amendment meets the criteria given in 10 CFR51.22(c)(9) for a categorical exclusion from the requirement for performing an Environmental Assessment/Impact Statement.