Duke Energy

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January 6, 2000

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

SUBJECT: Duke Energy Corporation (DEC)
McGuire Nuclear Station Units 1 and 2
Docket Nos. 50-369/50-370

Proposed Technical Specification (TS) Amendments
TS 3.3.1 - Reactor Trip System Instrumentation
TS 3.3.2 - Engineered Safety Feature Actuation System Instrumentation
TS 3.3.5 - Loss of Power Diesel Generator Start Instrumentation
TS 3.3.6 - Containment Purge and Exhaust Isolation Instrumentation

Pursuant to 10CFR50.90 and 10CFR50.4, this letter submits a license amendment request (LAR) for the McGuire Nuclear Station Facility Operating License (FOL) and Technical Specifications (TS). This amendment is applicable to Facility Operating Licenses NPF-9 and NPF-17 for the McGuire Nuclear Station. The changes proposed in this LAR are consistent with changes submitted by the Catawba Nuclear Station in a LAR dated March 25, 1999 which was approved by the NRC on August 13, 1999.

The changes proposed by DEC in this LAR will facilitate treatment of the Reactor Trip System (RTS) Instrumentation, Engineered Safety Feature Actuation System (ESFAS) Instrumentation, Loss of Power Diesel Generator Start Instrumentation (LOP), and Containment Purge and Exhaust Isolation Instrumentation (VP) TS Trip Setpoints as nominal values. Currently, the instrumentation Trip Setpoints specified in the subject TS's contain inequalities. It is Duke Energy's position that these inequalities do not represent absolute limits for the as-left condition of these setpoints. Instead, the setpoints and their associated inequalities are nominal values which allow the trip setpoints to be left at the value specified in the TS's plus or minus an instrument calibration setting tolerance. As described in previous correspondence from DEC to the NRC dated August 20, 1998 and September 30,

A001

bxc: (w. attachments)

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1998, this position is supported by the licensing basis for the McGuire Station and the regulatory positions used to develop the licensing basis. However, DEC recognizes that the subject TS's could be revised to remove any ambiguity as to whether the specified trip points represent absolute or nominal values. Consequently, this LAR will change the subject TS's to provide clarification that the specified setpoints represent nominal values.

Attachment 1 provides marked up pages of the existing McGuire TS's showing the proposed changes. Attachment 2 contains the new McGuire TS pages. The Description of Proposed Changes and Technical Justification is provided in Attachment 3. Pursuant to 10CFR50.92, Attachment 4 documents the determination that this proposed amendment contains No Significant Hazards Considerations. Pursuant to 10CFR51.22 (c)(9), Attachment 5 provides the basis for the categorical exclusion from performing an Environmental Assessment/Impact Statement. Marked up portions of the applicable McGuire TS BASES are included in Attachment 6 while the new BASES are contained in Attachment 7. These BASES changes are included in order to show proposed changes resulting from this LAR and to provide additional information supporting DEC's position that the subject setpoints represent nominal values. Implementation of these amendments to the McGuire FOL and TS's will not impact the McGuire Station's UFSAR.

In accordance with Duke internal procedures and the Quality Assurance Program Topical Report, this proposed amendment has been previously reviewed and approved by the McGuire Station Plant Operations Review Committee and the Duke Corporate Nuclear Safety Review Board. Consequently, during NRC review of this LAR, the McGuire Station will continue the current practice of treating the subject Trip Setpoints as nominal values and leaving these setpoints at the value specified in the TS's plus or minus an instrument calibration setting tolerance.

Pursuant to 10CFR50.91, a copy of this LAR is being forwarded to the appropriate North Carolina State Officials.

Please direct questions on this LAR to Julius Bryant at 704-875-4162.

Very truly yours,

H. B. Barron, Site Vice President
McGuire Nuclear Station

Attachments

xc: (w/attachments)

L.A. Reyes
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H. B. Barron, being duly sworn, states that he is Site Vice President McGuire Nuclear Station; that he is authorized on the part of Duke Energy Corporation to sign and file with the U.S. Nuclear Regulatory Commission these revisions to the McGuire Nuclear Station Facility Operating Licenses Nos. NPF-9 and NPF-17; and, that all statements and matters set forth therein are true and correct to the best of his knowledge.

H. B. Barron, Site Vice President
McGuire Nuclear Station
Duke Energy Corporation

Subscribed and sworn to before me this 6th day of January 2000.

Deborah G. Thorp

Notary Public

My Commission Expires:

4/6/2002

ATTACHMENT 1

PROPOSED REVISIONS TO THE McGUIRE NUCLEAR STATION TECHNICAL SPECIFICATIONS

1.1 Definitions (continued)

MASTER RELAY TEST	A MASTER RELAY TEST shall consist of energizing each master relay and verifying the OPERABILITY of each relay. The MASTER RELAY TEST shall include a continuity check of each associated slave relay.
MODE	A MODE shall correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.
INSERT - SEE NEXT PAGE →	
OPERABLE—OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
PHYSICS TESTS	PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation. These tests are: a. Described in Chapter 14 of the UFSAR; b. Authorized under the provisions of 10 CFR 50.59; or c. Otherwise approved by the Nuclear Regulatory Commission.
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3411 MWt.

(continued)

NOMINAL TRIP SETPOINT	The NOMINAL TRIP SETPOINT shall be the design value of a setpoint. The trip setpoint implemented in plant hardware may be less or more conservative than the NOMINAL TRIP SETPOINT by a calibration tolerance. If plant conditions warrant, the trip setpoint implemented in plant hardware may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT.

INSERT FOR PAGE 1.1-4

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

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
		3(a), 4(a), 5(a)	2	C	SR 3.3.1.14	NA	NA
2.	Power Range Neutron Flux						
	a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 110% RTP	≤ 109% RTP
	b. Low	1(b),2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 26% RTP	≤ 25% RTP
3.	Power Range Neutron Flux Rate						
	High Positive Rate	1,2	4	D	SR 3.3.1.7 SR 3.3.1.11	≤ 5.5% RTP with time constant ≥ 2 sec	≤ 5% RTP with time constant ≥ 2 sec
4.	Intermediate Range Neutron Flux	1(b), 2(c)	2	F,G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	≤ 25% RTP
		2(d)	2	H	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	≤ 25% RTP
5.	Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 1.3 E5 cps	≤ 1.0 E5 cps
		3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11	≤ 1.3 E5 cps	≤ 1.0 E5 cps
		3(e), 4(e), 5(e)	1	L	SR 3.3.1.1 SR 3.3.1.11	N/A	N/A

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(b) Below the P-10 (Power Range Neutron Flux) interlocks.
(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.
(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.

Table 3.3.1-1 (page 2 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-18)	Refer to Note 1 (Page 3.3.1-18)
7. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 2 (Page 3.3.1-19)	Refer to Note 2 (Page 3.3.1-19)
8. Pressurizer Pressure						
a. Low	1(f)	4	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1935 psig	≥ 1945 psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2395 psig	≤ 2385 psig
9. Pressurizer Water Level - High	1(f)	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93%	≤ 92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(g)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 90%	≥ 91%
b. Two Loops	1(h)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 90%	≥ 91%
11. Undervoltage RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 5016 V	≥ 5082 V

(continued)

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 3 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
12. Underfrequency RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 55.9 Hz	≥ 56.4 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 15%	≥ 16.7%
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(g)	3	O	SR 3.3.1.10 SR 3.3.1.15	≥ 42 psig	≥ 45 psig
b. Turbine Stop Valve Closure	1(g)	4	P	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open	≥ 1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.5 SR 3.3.1.14	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	S	SR 3.3.1.11 SR 3.3.1.13	≥ 4E-11 amp	≥ 1E-10 amp
b. Low Power Reactor Trips Block, P-7	1	1 per train	T	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 49% RTP	≤ 48% RTP
d. Power Range Neutron Flux, P-10	1,2	4	S	SR 3.3.1.11 SR 3.3.1.13	≥ 7% RTP and ≤ 11% RTP	≥ 10% RTP
e. Turbine Impulse Pressure, P-13	1	2	T	SR 3.3.1.12 SR 3.3.1.13	≤ 11% turbine impulse pressure equivalent	≤ 10% turbine impulse pressure equivalent

(continued)

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 4 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
17. Reactor Trip Breakers[i]	1,2	2 trains	R, V	SR 3.3.1.4	NA	NA
	3[a], 4[a], 5[a]	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	U	SR 3.3.1.4	NA	NA
	3[a], 4[a], 5[a]	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	Q, V	SR 3.3.1.5	NA	NA
	3[a], 4[a], 5[a]	2 trains	C	SR 3.3.1.5	NA	NA

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(i) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

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

Note 1: Overtemperature ΔT

NOMINAL TRIP SETPOINT

The Overtemperature ΔT Function Allowable Value shall not exceed the following Trip Setpoint by more than 4.4% 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

NOMINAL TRIP SETPOINT

K_1 = Overtemperature ΔT reactor 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 ~~Trip Setpoint~~ NOMINAL TRIP SETPOINT by more than 3.0% 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 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 ~~trip setpoint~~ 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)

Table 3.3.2-1 (page 1 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 1.2 psig	≤ 1.1 psig
d. Pressurizer Pressure - Low Low	1,2,3[(a)]	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≥ 1835 psig	≥ 1845 psig
2. Containment Spray						
a. Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 3.0 psig	≤ 2.9 psig
3. Containment Isolation						
a. Phase A Isolation						
(1) Manual Initiation	1,2,3,4	2	B	SR 3.3.2.7	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

Table 3.3.2-1 (page 2 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation (continued)						
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
(1) Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.7	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(3) Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8	≤ 3.0 psig	≤ 2.9 psig
4. Steam Line Isolation						
a. Manual Initiation						
(1) System	1,2(b),3(b)	2 trains	F	SR 3.3.2.7	NA	NA
(2) Individual	1,2(b),3(b)	1 per line	G	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2(b),3(b)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2(b), 3(b)	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 3.0 psig	≤ 2.9 psig
d. Steam Line Pressure						
(1) Low	1,2(b), 3(a)(b)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≥ 755 psig	≥ 775 psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.
(b) Except when all MSIVs are closed and de-activated.

Table 3.3.2-1 (page 3 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Steam Line Isolation (continued)						
(2) Negative Rate - High	$3^{(b)(c)}$	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ $120^{(d)}$ psi	$100^{(d)}$ psi
5. Turbine Trip and Feedwater Isolation						
a. Automatic Actuation Logic and Actuation Relays	$1,2^{(e)}$	2 trains	I	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - High High (P-14)	$1,2^{(e)}$	3 per SG	J	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.8 SR 3.3.2.9	≤ 85.6%	83.9%
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. T_{avg}-Low	$1,2^{(e)}$	1 per loop	J	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8	≥ 551°F	553°F
coincident with Reactor Trip, P-4	Refer to Function 8.a (Reactor Trip, P-4) for all initiation functions and requirements.					
e. Doghouse Water Level-High High	$1,2^{(e)}$	2 per train per Doghouse	L,M	SR 3.3.2.1 SR 3.3.2.7	≤ 13 inches	12 inches
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≥ 15%	16.7%

(continued)

(b) Except when all MSIVs are closed and de-activated.
(c) Trip function automatically blocked above P-11 (Pressurizer Pressure) interlock and may be blocked below P-11 when Safety Injection Steam Line Pressure-Low is not blocked.
(d) Time constant utilized in the rate/lag controller is ≥ 50 seconds.
(e) Except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

Table 3.3.2-1 (page 4 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater (continued)						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Station Blackout						
(1) Loss of voltage	1,2,3	3 per bus	D	SR 3.3.2.7 SR 3.3.2.9	≥ 3122 V (Unit 1) ≥ 3108 V (Unit 2) with 8.5 ± 0.5 sec time delay	≥ 3174 V (Unit 1) ≥ 3157 V (Unit 2) ± 45 V with 8.5 ± 0.5 sec time delay
(2) Degraded Voltage	1,2,3	3 per bus	D	SR 3.3.2.7 SR 3.3.2.9	≥ 3661 V (Unit 1) ≥ 3685.5 V (Unit 2) with ≤ 11 sec with SI and ≤ 600 sec without SI time delay	≥ 3678.5 V (Unit 1) ≥ 3703 V (Unit 2) with ≤ 11 sec with SI and ≤ 600 sec without SI time delay
e. Trip of all Main Feedwater Pumps	1,2(a)	1 per MFW pump	K	SR 3.3.2.7 SR 3.3.2.9	NA	NA
f. Auxiliary Feedwater Pump Suction Transfer on Suction Pressure - Low	1,2,3	2 per MDP, 4 per TDP	N,O	SR 3.3.2.7 SR 3.3.2.8 SR 3.3.2.9	≥ 1 psig	≥ 2 psig
7. Automatic Switchover to Containment Sump						
a. Refueling Water Storage Tank (RWST) Level - Low	1,2,3	3	P	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.8 SR 3.3.2.9	≥ 175.85 inches	≥ 180 inches
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.

Table 3.3.2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.7	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	Q	SR 3.3.2.5 SR 3.3.2.8	≤ 1965 psig	≤ 1955 psig
c. T_{avg} - Low Low, P-12	1,2,3	1 per loop	Q	SR 3.3.2.5 SR 3.3.2.8	≥ 551°F	≥ 553°F
9. Containment Pressure Control System	1,2,3,4	4 per train, 2 trains	R	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.8	Refer to Note 1 on Page 3.3.2-15	Refer to Note 1 on page 3.3.2-15

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.5.1	Perform TADOT.	31 days
SR 3.3.5.2	Perform CHANNEL CALIBRATION with ~~Trip Setpoint~~ NOMINAL TRIP SETPOINT and Allowable Value as follows: a. Loss of voltage Allowable Value ≥ 3122 V (Unit 1) ≥ 3108 V (Unit 2) with a time delay of 8.5 ± 0.5 second. Loss of voltage ~~Trip Setpoint~~ NOMINAL TRIP SETPOINT ~~≥~~ 3174 V (Unit 1) ~~≥~~ 3157 V (Unit 2) ± 45 V with a time delay of 8.5 ± 0.5 second. b. Degraded voltage Allowable Value ≥ 3661 V (Unit 1) ≥ 3685.5 V (Unit 2) with a time delay of ≤ 11 seconds with SI and ≤ 600 seconds without SI. Degraded voltage ~~Trip Setpoint~~ NOMINAL TRIP SETPOINT ~~≥~~ 3678.5 V (Unit 1) ~~≥~~ 3703 V (Unit 2) with a time delay of ≤ 11 seconds with SI and ≤ 600 seconds without SI.	18 months

Table 3.3.6-1 (page 1 of 1)
Containment Purge and Exhaust Isolation Instrumentation

	FUNCTION	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	NOMINAL TRIP SETPOINT
1.	Manual Initiation	2	SR 3.3.6.4	NA
2.	Automatic Actuation Logic and Actuation Relays	2 trains	SR 3.3.6.1 SR 3.3.6.2 SR 3.3.6.3	NA
3.	Safety Injection	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.		

ATTACHMENT 2

REVISED McGUIRE NUCLEAR STATION TECHNICAL SPECIFICATIONS

1.1 Definitions (continued)

MASTER RELAY TEST	A MASTER RELAY TEST shall consist of energizing each master relay and verifying the OPERABILITY of each relay. The MASTER RELAY TEST shall include a continuity check of each associated slave relay.
MODE	A MODE shall correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.
NOMINAL TRIP SETPOINT	The NOMINAL TRIP SETPOINT shall be the nominal design value of a setpoint. The trip setpoint implemented in plant hardware may be less or more conservative than the NOMINAL TRIP SETPOINT by a calibration tolerance. If plant conditions warrant, the trip setpoint implemented in plant hardware may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT.
OPERABLE — OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
PHYSICS TESTS	PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation. These tests are: a. Described in Chapter 14 of the UFSAR; b. Authorized under the provisions of 10 CFR 50.59; or c. Otherwise approved by the Nuclear Regulatory Commission.

(continued)

1.1 Definitions (continued)

QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3411 MWt.
REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.
SHUTDOWN MARGIN (SDM)	SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming: a. All rod cluster control assemblies (RCCAs) are fully inserted except for the single RCCA of highest reactivity worth, which is assumed to be fully withdrawn. With any RCCA not capable of being fully inserted, the reactivity worth of the RCCA must be accounted for in the determination of SDM; and b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the nominal zero power design level.
SLAVE RELAY TEST	A SLAVE RELAY TEST shall consist of energizing each slave relay and verifying the OPERABILITY of each slave relay. The SLAVE RELAY TEST shall include, as a minimum, a continuity check of associated testable actuation devices.
STAGGERED TEST BASIS	A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.

(continued)

1.1 Definitions (continued)

THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.
TRIP ACTUATING DEVICE OPERATIONAL TEST (TADOT)	A TADOT shall consist of operating the trip actuating device and verifying the OPERABILITY of required alarm, interlock, and trip functions. The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the required accuracy.

Table 1.1-1 (page 1 of 1)
MODES

MODE	TITLE	REACTIVITY CONDITION (k_{eff})	% RATED THERMAL POWER[a]	AVERAGE REACTOR COOLANT TEMPERATURE (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 350
4	Hot Shutdown[b]	< 0.99	NA	$350 > T_{avg} > 200$
5	Cold Shutdown[b]	< 0.99	NA	≤ 200
6	Refueling[c]	NA	NA	NA

(a) Excluding decay heat.

(b) All reactor vessel head closure bolts fully tensioned.

(c) One or more reactor vessel head closure bolts less than fully tensioned.

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
	3(a), 4(a), 5(a)	2	C	SR 3.3.1.14	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 110% RTP	109% RTP
b. Low	1(b),2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 26% RTP	25% RTP
3. Power Range Neutron Flux Rate						
High Positive Rate	1,2	4	D	SR 3.3.1.7 SR 3.3.1.11	≤ 5.5% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
4. Intermediate Range Neutron Flux	1(b), 2(c)	2	F,G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	25% RTP
	2(d)	2	H	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	25% RTP
5. Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 1.3 E5 cps	1.0 E5 cps
	3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11	≤ 1.3 E5 cps	1.0 E5 cps
	3(e), 4(e), 5(e)	1	L	SR 3.3.1.1 SR 3.3.1.11	N/A	N/A

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(b) Below the P-10 (Power Range Neutron Flux) interlocks.
(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.
(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.

Table 3.3.1-1 (page 2 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-18)	Refer to Note 1 (Page 3.3.1-18)
7. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 2 (Page 3.3.1-19)	Refer to Note 2 (Page 3.3.1-19)
8. Pressurizer Pressure						
a. Low	1(f)	4	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1935 psig	1945 psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2395 psig	2385 psig
9. Pressurizer Water Level - High	1(f)	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93%	92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1(g)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 90%	91%
b. Two Loops	1(h)	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 90%	91%
11. Undervoltage RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 5016 V	5082 V

(continued)

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 3 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
12. Underfrequency RCPs	1(f)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 55.9 Hz	56.4 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 15%	16.7%
14. Turbine Trip						
a. Low Fluid Oil Pressure	1(g)	3	O	SR 3.3.1.10 SR 3.3.1.15	≥ 42 psig	45 psig
b. Turbine Stop Valve Closure	1(g)	4	P	SR 3.3.1.10 SR 3.3.1.15	≥ 1% open	≥ 1% open
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	Q	SR 3.3.1.5 SR 3.3.1.14	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	S	SR 3.3.1.11 SR 3.3.1.13	≥ 4E-11 amp	1E-10 amp
b. Low Power Reactor Trips Block, P-7	1	1 per train	T	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 49% RTP	48% RTP
d. Power Range Neutron Flux, P-10	1,2	4	S	SR 3.3.1.11 SR 3.3.1.13	≥ 7% RTP and ≤ 11% RTP	10% RTP
e. Turbine Impulse Pressure, P-13	1	2	T	SR 3.3.1.12 SR 3.3.1.13	≤ 11% turbine impulse pressure equivalent	10% turbine impulse pressure equivalent

(continued)

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(f) Above the P-7 (Low Power Reactor Trips Block) interlock.

(g) Above the P-8 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 4 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
17. Reactor Trip Breakers[(i)]	1,2	2 trains	R, V	SR 3.3.1.4	NA	NA
	3[(a)], 4[(a)], 5[(a)]	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	U	SR 3.3.1.4	NA	NA
	3[(a)], 4[(a)], 5[(a)]	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	Q, V	SR 3.3.1.5	NA	NA
	3[(a)], 4[(a)], 5[(a)]	2 trains	C	SR 3.3.1.5	NA	NA

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(i) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

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.

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

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.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right) \leq \Delta T_0 \left\{K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 s}\left(\frac{1}{1+\tau_6 s}\right)T - K_6\left[T\frac{1}{1+\tau_6 s} - T^{\prime}\right] - f_2(\Delta I)\right\}$$

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.
$T^{\prime}$ 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 $T > T^{\prime}$ and $K_6 = 0$ for $T \leq T^{\prime}$,
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)

Table 3.3.2-1 (page 1 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection						
a. Manual Initiation	1,2,3,4	2	B	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 1.2 psig	1.1 psig
d. Pressurizer Pressure - Low Low	1,2,3[a]	4	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≥ 1835 psig	1845 psig
2. Containment Spray						
a. Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 3.0 psig	2.9 psig
3. Containment Isolation						
a. Phase A Isolation						
(1) Manual Initiation	1,2,3,4	2	B	SR 3.3.2.7	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA

(continued)

(a) Above the P-11 (Pressurizer Pressure) Interlock.

Table 3.3.2-1 (page 2 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation (continued)						
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
(1) Manual Initiation	1,2,3,4	1 per train, 2 trains	B	SR 3.3.2.7	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1,2,3,4	2 trains	C	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
(3) Containment Pressure - High High	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8	≤ 3.0 psig	2.9 psig
4. Steam Line Isolation						
a. Manual Initiation						
(1) System	1,2(b),3(b)	2 trains	F	SR 3.3.2.7	NA	NA
(2) Individual	1,2(b),3(b)	1 per line	G	SR 3.3.2.7	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2(b),3(b)	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High High	1,2(b), 3(b)	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≤ 3.0 psig	2.9 psig
d. Steam Line Pressure						
(1) Low	1,2(b), 3(a)(b)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	≥ 755 psig	775 psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) interlock.
(b) Except when all MSIVs are closed and de-activated.

Table 3.3.2-1 (page 3 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Steam Line Isolation (continued)						
(2) Negative Rate - High	$3^{(b)(c)}$	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	$\leq 120^{(d)}$ psi	$100^{(d)}$ psi
5. Turbine Trip and Feedwater Isolation						
a. Automatic Actuation Logic and Actuation Relays	$1,2^{(e)}$	2 trains	I	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - High High (P-14)	$1,2^{(e)}$	3 per SG	J	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.8 SR 3.3.2.9	$\leq$ 85.6%	83.9%
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. T_{avg}-Low	$1,2^{(e)}$	1 per loop	J	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8	$\geq$ 551°F	553°F
coincident with Reactor Trip, P-4	Refer to Function 8.a (Reactor Trip, P-4) for all initiation functions and requirements.					
e. Doghouse Water Level-High High	$1,2^{(e)}$	2 per train per Doghouse	L,M	SR 3.3.2.1 SR 3.3.2.7	$\leq$13 inches	12 inches
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1,2,3	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.8 SR 3.3.2.9	$\geq$ 15%	16.7%

(continued)

(b) Except when all MSIVs are closed and de-activated.
(c) Trip function automatically blocked above P-11 (Pressurizer Pressure) interlock and may be blocked below P-11 when Safety Injection Steam Line Pressure-Low is not blocked.
(d) Time constant utilized in the rate/lag controller is $\geq$ 50 seconds.
(e) Except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

Table 3.3.2-1 (page 4 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater (continued)						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Station Blackout						
(1) Loss of voltage	1,2,3	3 per bus	D	SR 3.3.2.7 SR 3.3.2.9	≥ 3122 V (Unit 1) ≥ 3108 V (Unit 2) with 8.5 ± 0.5 sec time delay	3174 V (Unit 1) 3157 V (Unit 2) ± 45 V with 8.5 ± 0.5 sec time delay
(2) Degraded Voltage	1,2,3	3 per bus	D	SR 3.3.2.7 SR 3.3.2.9	≥ 3661 V (Unit 1) ≥ 3685.5 V (Unit 2) with ≤ 11 sec with SI and ≤ 600 sec without SI time delay	3678.5 V (Unit 1) 3703 V (Unit 2) with ≤ 11 sec with SI and ≤ 600 sec without SI time delay
e. Trip of all Main Feedwater Pumps	1,2[(a)]	1 per MFW pump	K	SR 3.3.2.7 SR 3.3.2.9	NA	NA
f. Auxiliary Feedwater Pump Suction Transfer on Suction Pressure - Low	1,2,3	2 per MDP, 4 per TDP	N,O	SR 3.3.2.7 SR 3.3.2.8 SR 3.3.2.9	≥ 1 psig	2 psig
7. Automatic Switchover to Containment Sump						
a. Refueling Water Storage Tank (RWST) Level - Low	1,2,3	3	P	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.8 SR 3.3.2.9	≥ 175.85 inches	180 inches
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(a) Above the P-11 (Pressurizer Pressure) Interlock.

Table 3.3.2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1,2,3	1 per train, 2 trains	F	SR 3.3.2.7	NA	NA
b. Pressurizer Pressure, P-11	1,2,3	3	Q	SR 3.3.2.5 SR 3.3.2.8	≤ 1965 psig	1955 psig
c. T_{avg} - Low Low, P-12	1,2,3	1 per loop	Q	SR 3.3.2.5 SR 3.3.2.8	≥ 551°F	553°F
9. Containment Pressure Control System	1,2,3,4	4 per train, 2 trains	R	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.8	Refer to Note 1 on Page 3.3.2-15	Refer to Note 1 on page 3.3.2-15

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.5.1	Perform TADOT.	31 days
SR 3.3.5.2	Perform CHANNEL CALIBRATION with NOMINAL TRIP SETPOINT and Allowable Value as follows: a. Loss of voltage Allowable Value ≥ 3122 V (Unit 1) ≥ 3108 V (Unit 2) with a time delay of 8.5 ± 0.5 second. Loss of voltage NOMINAL TRIP SETPOINT 3174 V (Unit 1) 3157 V (Unit 2) ± 45 V with a time delay of 8.5 ± 0.5 second. b. Degraded voltage Allowable Value ≥ 3661 V (Unit 1) ≥ 3685.5 V (Unit 2) with a time delay of ≤ 11 seconds with SI and ≤ 600 seconds without SI. Degraded voltage NOMINAL TRIP SETPOINT 3678.5 V (Unit 1) 3703 V (Unit 2) with a time delay of ≤ 11 seconds with SI and ≤ 600 seconds without SI.	18 months

Table 3.3.6-1 (page 1 of 1)
Containment Purge and Exhaust Isolation Instrumentation

	FUNCTION	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	NOMINAL TRIP SETPOINT
1.	Manual Initiation	2	SR 3.3.6.4	NA
2.	Automatic Actuation Logic and Actuation Relays	2 trains	SR 3.3.6.1 SR 3.3.6.2 SR 3.3.6.3	NA
3.	Safety Injection	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.		

ATTACHMENT 3

DESCRIPTION OF PROPOSED CHANGES AND TECHNICAL JUSTIFICATION

Proposed Changes

In accordance with the requirements of 10CFR50.90 and 10CFR50.4, DEC proposes to revise the McGuire Nuclear Station TS's as stated below. The proposed revisions will facilitate treatment of the applicable RTS, ESFAS, LOP, and VP Instrumentation TS Trip Setpoints as nominal values. In addition, proposed changes to the applicable TS Bases (Attachments 6 and 7) are included which further define the TS Trip Setpoints as nominal values.

The proposed changes are as follows:

1. Inequalities associated with the TRIP SETPOINT columns of TS Tables 3.3.1-1 and 3.3.2-1 would be deleted.

2. The column heading "TRIP SETPOINT" in TS Tables 3.3.1-1 and 3.3.2-1 would be changed to "NOMINAL TRIP SETPOINT".

3. The column heading "TRIP SETPOINT" in TS Table 3.3.6-1 would be changed to "NOMINAL TRIP SETPOINT".

4. "Trip Setpoint" in the first sentence of Table 3.3.1-1 Note 1 would be changed to "NOMINAL TRIP SETPOINT". "Trip Setpoint" in the definition of K_1 in Table 3.3.1-1 Note 1 would be changed to "NOMINAL TRIP SETPOINT".

5. "Trip Setpoint" in the first sentence of Table 3.3.1-1 Note 2 would be changed to "NOMINAL TRIP SETPOINT". "Trip Setpoint" in the definition of K_4 in Table 3.3.1-1 Note 2 would be changed to "NOMINAL TRIP SETPOINT".

6. Each instance of "Trip Setpoint" in TS Surveillance 3.3.5.2 would be changed to "NOMINAL TRIP SETPOINT".

7. TS Section 1.1 Definitions would be revised to add the definition of NOMINAL TRIP SETPOINT.

8. The inequalities in TS Surveillance 3.3.5.2 associated with the Unit 1 and Unit 2 Loss of Voltage Trip Setpoints (3174V and 3157V respectively) and the Unit 1 and Unit 2 Degraded Voltage Trip Setpoints (3678.5V and 3703V respectively) would be deleted.

9. An inequality will be added to the Allowable Value for Doghouse Water Level-High High in TS Table 3.3.2-1, Function 5e.

Basis for Proposed Changes

A) Proposed Changes #1, #2, #4, #5, and #7

Note that these proposed changes are submitted for clarification only and do not represent a change in DEC's position and methodologies which treat the subject setpoints and their associated inequalities as nominal values.

Background:

Section 7.1.2.4 of the McGuire UFSAR provides instrument range and setpoint design criteria for safety-related instrumentation at the station. These sections describe three setpoints - Safety Limit Setpoint, Limiting Setpoint, and Nominal Setpoint. The Limiting Setpoint is described as the Technical Specification value. Duke Energy interprets this Limiting Setpoint to be the Limiting Safety System Setting (LSSS). The Nominal Setpoint is the value set into the instrument. As described in the McGuire Station setpoint methodologies outlined in the following paragraph, this as-left setpoint value allows for normal instrument drift such that the Technical Specification limit (limiting or LSSS value) is not exceeded.

The setpoint methodologies used for calibrating some of the Reactor Protection System and Engineered Safety Features Actuation System instrumentation at McGuire is described in a Westinghouse document titled "Westinghouse Reactor Protection System/Engineered Safety Features Actuation System Setpoint Methodology". The balance of the Reactor Protection System and Engineered Safety Features Actuation System instrumentation is calibrated using a setpoint methodology described in an Engineering Directives Manual (EDM). The methodology described in the EDM is consistent with the philosophy in the above Westinghouse document which indicates that no action is required by plant staff as long as the as-left Trip Setpoint error is less than or equal to that required to ensure the Allowable Value (LSSS value for McGuire) is not exceeded. This setpoint methodology information indicates that, as long as the LSSS value is not exceeded, it is acceptable for the applicable safety-related instrumentation as-left Trip Setpoints to be exceeded by the instrument calibration setting tolerances. A review of current McGuire Station practices related to Reactor Protection System and Engineered Safety Features Actuation System instrumentation setpoints indicates that the as-left instrument calibration setting tolerances utilized are consistent with the above methodologies and the McGuire Station safety analyses.

The approved McGuire Nuclear Station Standardized Technical Specifications (STS) were developed in accordance with NUREG-1431. STS sections 3.3.1 and 3.3.2 specify the Trip Setpoints for the Reactor Trip System Instrumentation and the Engineered Safety Features Actuation System Instrumentation at the McGuire Nuclear Station. The BASES associated with these STS sections provide clarifying information related to as-left setpoints for the Reactor Trip System Instrumentation and the Engineered Safety Features Actuation System Instrumentation. The BASES for these sections state the following:

"The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as-left" value is within the band for CHANNEL CALIBRATION accuracy."

Conclusion:

The above information and other statements in the BASES for STS sections 3.3.1 and 3.3.2 (Attachments 6 and 7) supports DEC's position that the Reactor Trip System Instrumentation and the Engineered Safety Features Actuation System Instrumentation TS Trip Setpoints are nominal values and that these setpoints can be left at the value specified in the TS's plus or minus an instrument calibration setting tolerance.

B) Proposed Change #3

Background:

TS Table 3.3.6-1 contains requirements for the VP actuation instrumentation. In this table, no additional setpoint requirements are specified beyond those already specified in TS Table 3.3.2-1, ESFAS Instrumentation. The automatic actuation logic and actuation relays consist of the same features and operate in the same manner as described for ESFAS Function 1b, Safety Injection and ESFAS Function 3a, Containment Isolation in TS Table 3.3.2-1.

Conclusion:

Changing the Trip Setpoint column heading to "NOMINAL TRIP SETPOINT" will ensure consistency with ESFAS Table 3.3.2-1.

C. Proposed Changes #6 and #8

Background:

The BASES for TS 3.3.5 (Attachments 6 and 7) contain the following statement:

"Allowable Values and Trip Setpoints are specified for each Function in the LCO. The trip setpoints are selected to ensure that the setpoint measured by the surveillance procedure does not exceed the Allowable Value if the relay is performing as required. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE. Operation with a Trip Setpoint less conservative than the nominal Trip Setpoint, but within the Allowable Value, is acceptable provided that operation and testing is consistent with the assumptions of the unit specific setpoint calculation. Each Allowable Value and Trip Setpoint specified is more conservative than the analytical limit assumed in the transient and accident analyses in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in setpoint calculations (Ref. 3)."

Conclusion:

This above background information supports DEC's position that the Loss of Voltage and Degraded Voltage Trip Setpoints specified in Surveillance Requirement 3.3.5.2 are nominal values and that these setpoints can be left at the value specified in the TS's plus or minus an instrument calibration setting tolerance.

D. Proposed Change #9

Background:

In the event of a postulated pipe break in the main feedwater piping in the Doghouses, the Doghouse Water Level High-High function signal terminates forward feedwater flow to prevent flooding safety related equipment essential to the safe shutdown of the plant. A review of McGuire Design Basis information indicates that flooding of such safety related equipment is not a concern with Doghouse water levels $\leq$ 13 inches.

Conclusion:

Based upon the above background information, it is acceptable for the Allowable Value of Function 5e in TS Table 3.3.2-1 to be changed to read $\leq$ 13 inches. The addition of the inequality is consistent with similar requirements for Doghouse Water Level High-High in the Catawba Nuclear Station Technical Specifications.

<u>Summary</u>

Revisions to the McGuire TS's as shown in proposed changes #1, #2, #4, #5, and #7 are consistent with the setpoint methodologies described in the Westinghouse setpoint methodology document and the EDM. Proposed changes #6 and #8 are consistent with statements in the BASES for TS 3.3.5. Revising the McGuire TS's as shown in proposed change #3 provides clarification to TS Table 3.3.6-1 and ensures consistency with ESFAS Table 3.3.2-1. Revisions to the McGuire TS's as outlined in proposed change #9 are consistent with the McGuire Design Bases and similar requirements in the Catawba Nuclear Station Technical Specifications.

ATTACHMENT 4

NO SIGNIFICANT HAZARDS CONSIDERATIONS

No Significant Hazards Considerations:

In accordance with the criteria set forth in 10 CFR 50.91 and 50.92, McGuire Nuclear Station has evaluated this proposed Technical Specification change and determined it does not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

No. The proposed changes are consistent with the current licensing basis for the McGuire Nuclear Station, the setpoint methodologies used to develop the Trip Setpoints, the McGuire Safety Analyses, and current station calibration procedures and practices. The Reactor Trip System and Engineered Safety Features Actuation System are not accident initiating systems; they are accident mitigating systems. Therefore, these proposed changes will have no impact on any accident probabilities. Accident consequences will not be affected, as no changes are being made to the plant which will involve a reduction in reliability of these systems. Consequently, any previous evaluations associated with accidents will not be affected by these changes.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

No. The proposed changes are consistent with the current licensing basis for the McGuire Nuclear Station, the setpoint methodologies used to develop the Trip Setpoints, the McGuire Safety Analyses, and current station calibration procedures and practices. No changes are being made to actual plant hardware which will result in any new accident causal mechanisms. Also, no changes are being made to the way in which the plant is being operated. Therefore, no new accident causal mechanisms will be generated. Consequently, plant accident analyses will not be affected by these changes.

3. Does this change involve a significant reduction in a margin of safety?

No. The proposed changes are consistent with the current licensing basis for the McGuire Nuclear Station, the setpoint methodologies used to develop the Trip Setpoints, the McGuire Safety Analyses, and current station calibration procedures and practices. Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following accident conditions. These barriers include the fuel cladding, the reactor coolant system, and the containment system. The performance of these barriers will not be degraded by the proposed changes. Consequently, plant safety analyses will not be affected by these changes.

ATTACHMENT 5

ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment:

The proposed Technical Specification amendment has been reviewed against the criteria of 10 CFR 51.22 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 CFR 51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Assessment.

ATTACHMENT 6

PROPOSED REVISIONS TO THE McGUIRE NUCLEAR STATION TECHNICAL SPECIFICATION BASES

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

The LSSS, defined in this specification as the ~~Trip Setpoints~~, in conjunction with the LCOs, establish the ~~threshold for protective system~~ action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

Allowable Values

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);

2. Fuel centerline melt shall not occur; and

3. The RCS pressure SL of 2735 psig shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 20 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

BASES

BACKGROUND (continued)

The RTS instrumentation is segmented into four distinct but interconnected categories as illustrated in UFSAR, Chapter 7 (Ref. 1), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured;

2. Process monitoring systems, including the Process Control System, the Nuclear Instrumentation System (NIS), and various field contacts and sensors: monitors various plant parameters, provides any required signal processing, and provides digital outputs when parameters exceed predetermined limits. They may also provide outputs for control, indication, alarm, computer input, and recording;

3. Solid State Protection System (SSPS), including input, logic, and output bays: combines the input signals from the process monitoring systems per predetermined logic and initiates a reactor trip and ESF actuation when warranted by the process monitoring systems inputs; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

NOMINAL TRIP SETPOINT

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed ~~to occur between calibrations,~~ statistical allowances are provided in the ~~Trip Setpoint~~ and Allowable Values. The OPERABILITY of each ~~transmitter or sensor can be~~ evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

BASES

BACKGROUND (continued)

Trip Setpoints and Allowable Values
NOMINAL TRIP SETPOINTS

The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION tolerance.

NOMINAL TRIP SETPOINTS NOMINAL TRIP SETPOINTS

The Trip Setpoints used in the bistables are based on the analytical limits (Ref. 1, 2, and 3). The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays, calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5) are taken into account. The actual nominal Trip Setpoint entered into the bistable assures that the actual trip occurs in time to prevent an analytical limit from being exceeded. as-left setpoint of

The Allowable Value accounts for changes in random measurement errors between COTs. One example of such a change in measurement error is drift during the surveillance interval. If the COT demonstrates that the loop trips within the Allowable Value, the loop is OPERABLE. A trip within the Allowable Value ensures that the predictions of equipment performance used to develop the Trip Setpoint are still valid, and that the equipment will initiate a trip in response to an AOO in time to prevent an analytical limit from being exceeded (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). Note that in the accompanying LCO 3.3.1, the Allowable Values of Table 3.3.1-1 are the LSSS. NOMINAL TRIP SETPOINT

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

Determination of the NOMINAL TRIP SETPOINTS

The Trip Setpoints and Allowable Values listed in Table 3.3.1-1 incorporate all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

NOMINAL TRIP SETPOINT

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the RTBs and associated bypass breakers are closed, and the CRD System is capable of rod withdrawal.

The RTS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6).

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1. When the Required Channels in Table 3.3.1-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

See Next Page

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip Function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 must be immediately entered if applicable in the current MODE of operation.

A.1

Condition A applies to all RTS protection Functions. Condition A addresses the situation where one or more required channels for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.1-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

B.1 and B.2

Condition B applies to the Manual Reactor Trip in MODE 1 or 2. This action addresses the train orientation of the SSPS for this Function. With

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

INSERT FOR PAGE B.3.3.1-28

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents.

The ESFAS instrumentation is segmented into three distinct but interconnected modules as identified below:

- Field transmitters or process sensors and instrumentation: provide a measurable electronic signal based on the physical characteristics of the parameter being measured;
- Signal processing equipment including analog protection system, field contacts, and protection channel sets: provide signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system devices, and control board/control room/miscellaneous indications; and
- Solid State Protection System (SSPS) including input, logic, and output bays: initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable outputs from the signal process control and protection system.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. In many cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which is assumed to occur between calibrations, statistical allowances are provided in the ~~Trip Setpoint~~ and Allowable Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

NOMINAL TRIP SETPOINT

BASES

BACKGROUND (continued)

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with setpoints established by safety analyses. These setpoints are defined in UFSAR, Chapter 6 (Ref. 1), Chapter 7 (Ref. 2), and Chapter 15 (Ref. 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the SSPS for decision logic processing. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more contfol systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of- two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in the UFSAR.

~~Trip Setpoints~~ and Allowable Values

NOMINAL TRIP SETPOINTS

The ~~Trip Setpoints~~ are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION tolerance.

BASES

BACKGROUND (continued)

NOMINAL TRIP SETPOINTS   NOMINAL TRIP SETPOINTS

The Trip Setpoints used in the bistables are based on the analytical limits (Ref. 1, 2, and 3). The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays, calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5) are taken into account. The actual nominal Trip Setpoint entered into the bistable assures that the actual trip occurs before the Allowable Value is reached. The Allowable Value accounts for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the point at which the loop trips does not exceed the Allowable Value, the loop is considered OPERABLE.

as-left setpoint of

A trip within the Allowable Value ensures that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

determination of the NOMINAL TRIP SETPOINTS

The Trip Setpoints and Allowable Values listed in Table 3.3.2-1 incorporate all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

incorporates

NOMINAL TRIP SETPOINT

<u>Solid State Protection System</u>

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

9. Containment Pressure Control System Permissives

The Containment Pressure Control System (CPCS) protects the Containment Building from excessive depressurization by preventing inadvertent actuation or continuous operation of the Containment Spray and Containment Air Return Systems when containment pressure is at or less than the CPCS permissive setpoint. The control scheme of CPCS is comprised of eight independent control circuits (4 per train), each having a separate and independent pressure transmitter and current alarm module. Each pressure transmitter monitors the containment pressure and provides input to its respective current alarm. The current alarms are set to inhibit or terminate containment spray and containment air return fan operation when containment pressure falls below the setpoint. The alarm modules switch back to the permissive state (allowing the systems to operate) when containment pressure is greater than or equal to the setpoint.

This function must be OPERABLE in MODES 1, 2, 3, and 4 when there is sufficient energy in the primary and secondary sides to pressurize containment following a pipe break. In MODES 5 and 6, there is insufficient energy in the primary and secondary sides to significantly pressurize the containment.

The ESFAS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6).

ACTIONS

SEE NEXT PAGE FOR CHANGES

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.2-1. When the Required Channels in Table 3.3.2-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument Loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected.

When the number of inoperable channels in a trip function exceed those specified in one or other related Conditions associated with a trip function, then the unit is outside the safety analysis. Therefore,

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

INSERT FOR PAGE B.3.3.2-27

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss of voltage or degraded voltage condition occurs in the switchyard. There are two LOP start signals, one for each 4.16 kV vital bus.

There is one undervoltage relay per phase connected in a two-out-of-three logic scheme on the 4160 V essential bus. For an actual loss of voltage to the bus, the normal incoming breaker is tripped, the 4160 volt essential bus is load shed, and the diesel generator breaker is closed provided the diesel generating unit has attained at least 95% speed.

There is one degraded voltage relay per phase connected in a two-out-of-three logic scheme. Once the undervoltage is detected, two time delay relays begin timing to verify the event is sustained. If the first timer completes its cycle, an alarm will be initiated in the control room. The second time delay relay is provided to allow additional time following the first time delay for the operators to improve voltage. If the undervoltage condition is still present when the second timing cycle is complete, the normal and standby incoming circuit breakers are tripped. The LOP start actuation is described in UFSAR, Section 8.3 (Ref. 1).

Trip Setpoints and Allowable Values

NOMINAL TRIP SETPOINTS NOMINAL TRIP SETPOINTS

The ~~Trip Setpoints~~ used in the relays are based on the analytical limits presented ~~in UFSAR, Chapter 15 (Ref. 2)~~. The selection of these ~~Trip Setpoints~~ is such that adequate protection is provided when all sensor and ~~processing time delays are taken~~ into account.

as-left setpoint of

The actual ~~nominal Trip Setpoint entered into~~ the relays is normally still ~~more conservative than that required by~~ the Allowable Value. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE.

Setpoints adjusted in accordance with the Allowable Value ensure that the consequences of accidents will be acceptable, providing the unit is operated from within the LCOs at the onset of the accident and that the equipment functions as designed.

BASES

BACKGROUND (continued)
NOMINAL TRIP SETPOINTS

SEE NEXT PAGE FOR CHANGES

Allowable Values and Trip Setpoints are specified for each Function in the LCO. The trip setpoints are selected to ensure that the setpoint measured by the surveillance procedure does not exceed the Allowable Value if the relay is performing as required. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE. Operation with a Trip Setpoint less conservative than the nominal Trip Setpoint, but within the Allowable Value, is acceptable provided that operation and testing is consistent with the assumptions of the unit specific setpoint calculation. Each Allowable Value and Trip Setpoint specified is more conservative than the analytical limit assumed in the transient and accident analyses in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in setpoint calculations (Ref. 3). NOMINAL TRIP SETPOINT

APPLICABLE SAFETY ANALYSES

The LOP DG start instrumentation is required for the Engineered Safety Features (ESF) Systems to function in any accident with a loss of offsite power. Its design basis is that of the ESF Actuation System (ESFAS).

Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power. The analyses assume a non- mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The required channels of LOP DG start instrumentation, in conjunction with the ESF systems powered from the DGs, provide unit protection in the event of any of the analyzed accidents discussed in Reference 2, in which a loss of offsite power is assumed.

The delay times assumed in the safety analysis for the ESF equipment include the 10 second DG start delay, and the appropriate sequencing delay, if applicable. The response times for ESFAS actuated equipment in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," include the appropriate DG loading and sequencing delay. The LOP DG start instrumentation channels satisfy Criterion 3 of 10 CFR 50.36 (Ref. 4).

A relay shall be OPERABLE if the point at which the relay trips is found equal to or more conservative than the Allowable Value. In the event a relay's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that relay must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

INSERT FOR PAGE B.3.3.5-2

BASES

LCO

The LCO for LOP DG start instrumentation requires that three channels per bus of both the loss of voltage and degraded voltage Functions shall be OPERABLE in MODES 1, 2, 3, and 4 when the LOP DG start instrumentation supports safety systems associated with the ESFAS. In MODES 5 and 6, the three channels must be OPERABLE whenever the associated DG is required to be OPERABLE to ensure that the automatic start of the DG is available when needed. Loss of the LOP DG Start Instrumentation Function could result in the delay of safety systems initiation when required. This could lead to unacceptable consequences during accidents. During the loss of offsite power the DG powers the motor driven auxiliary feedwater pumps. Failure of these pumps to start would leave only one turbine driven pump, as well as an increased potential for a loss of decay heat removal through the secondary system.

APPLICABILITY

The LOP DG Start Instrumentation Functions are required in MODES 1, 2, 3, and 4 because ESF Functions are designed to provide protection in these MODES. Actuation in MODE 5 or 6 is required whenever the required DG must be OPERABLE so that it can perform its function on an LOP or degraded power to the vital bus.

ACTIONS

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the channel is found inoperable, then the function that channel provides must be declared inoperable and the LCO Condition entered for the particular protection function affected.

SEE NEXT PAGE FOR CHANGES

Because the required channels are specified on a per bus basis, the Condition may be entered separately for each bus as appropriate.

Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in the LCO. The Completion Time(s) of the inoperable channel(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

Condition A applies to the LOP DG start Function with one loss of voltage or degraded voltage channel per bus inoperable.

If one channel is inoperable, Required Action A.1 requires that channel to be placed in trip within 6 hours. With a channel in trip, the LOP DG start

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

INSERT FOR PAGE B.3.3.5-3

BASES

ACTIONS (continued)

instrumentation channels are configured to provide a one-out-of-two logic to initiate a trip of the incoming offsite power.

The specified Completion Time is reasonable considering the Function remains fully OPERABLE on every bus and the low probability of an event occurring during these intervals.

B.1

Condition B applies when more than one loss of voltage or more than one degraded voltage channel on a single bus is inoperable.

Required Action B.1 requires restoring all but one channel to OPERABLE status. The 1 hour Completion Time should allow ample time to repair most failures and takes into account the low probability of an event requiring an LOP start occurring during this interval.

C.1

Condition C applies to each of the LOP DG start Functions when the Required Action and associated Completion Time for Condition A or B are not met.

In these circumstances the Conditions specified in LCO 3.8.1, "AC Sources-Operating," or LCO 3.8.2, "AC Sources—Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

SURVEILLANCE REQUIREMENTS

SR 3.3.5.1

SR 3.3.5.1 is the performance of a TADOT. This test is performed every 31 days. The test checks trip devices that provide actuation signals directly, bypassing the analog process control equipment. For these tests, the relay Trip Setpoints are verified and adjusted as necessary. The Frequency is based on the known reliability of the relays and controls and the multichannel redundancy available, and has been shown to be acceptable through operating experience.
NOMINAL TRIP SETPOINTS
Testing consists of voltage sensor relay testing only. Actuation of load shedding and time delay timers is not required.

ATTACHMENT 7

REVISED McGUIRE NUCLEAR STATION TECHNICAL SPECIFICATION BASES

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

The LSSS, defined in this specification as the Allowable Values, in conjunction with the LCOs, establish the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);

2. Fuel centerline melt shall not occur; and

3. The RCS pressure SL of 2735 psig shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 20 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

BASES

BACKGROUND (continued)

The RTS instrumentation is segmented into four distinct but interconnected categories as illustrated in UFSAR, Chapter 7 (Ref. 1), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured;

2. Process monitoring systems, including the Process Control System, the Nuclear Instrumentation System (NIS), and various field contacts and sensors: monitors various plant parameters, provides any required signal processing, and provides digital outputs when parameters exceed predetermined limits. They may also provide outputs for control, indication, alarm, computer input, and recording;

3. Solid State Protection System (SSPS), including input, logic, and output bays: combines the input signals from the process monitoring systems per predetermined logic and initiates a reactor trip and ESF actuation when warranted by the process monitoring systems inputs; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the NOMINAL TRIP SETPOINT and Allowable Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

BASES

BACKGROUND (continued)

Trip Setpoints and Allowable Values

The NOMINAL TRIP SETPOINTS are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION tolerance.

The NOMINAL TRIP SETPOINTS used in the bistables are based on the analytical limits (Ref. 1, 2, and 3). The selection of these NOMINAL TRIP SETPOINTS is such that adequate protection is provided when all sensor and processing time delays, calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5) are taken into account. The actual as-left setpoint of the bistable assures that the actual trip occurs in time to prevent an analytical limit from being exceeded.

The Allowable Value accounts for changes in random measurement errors between COTs. One example of such a change in measurement error is drift during the surveillance interval. If the COT demonstrates that the loop trips within the Allowable Value, the loop is OPERABLE. A trip within the Allowable Value ensures that the predictions of equipment performance used to develop the NOMINAL TRIP SETPOINT are still valid, and that the equipment will initiate a trip in response to an AOO in time to prevent an analytical limit from being exceeded (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). Note that in the accompanying LCO 3.3.1, the Allowable Values of Table 3.3.1-1 are the LSSS.

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

Determination of the NOMINAL TRIP SETPOINTS and Allowable Values listed in Table 3.3.1-1 incorporate all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each NOMINAL TRIP SETPOINT. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the RTBs and associated bypass breakers are closed, and the CRD System is capable of rod withdrawal.

The RTS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6).

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1. When the Required Channels in Table 3.3.1-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip Function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 must be immediately entered if applicable in the current MODE of operation.

<u>A.1</u>

Condition A applies to all RTS protection Functions. Condition A addresses the situation where one or more required channels for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.1-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

BASES

ACTIONS (continued)

B.1 and B.2

Condition B applies to the Manual Reactor Trip in MODE 1 or 2. This action addresses the train orientation of the SSPS for this Function. With one channel inoperable, the inoperable channel must be restored to OPERABLE status within 48 hours. In this Condition, the remaining OPERABLE channel is adequate to perform the safety function.

The Completion Time of 48 hours is reasonable considering that there are two automatic actuation trains and another manual initiation channel OPERABLE, and the low probability of an event occurring during this interval.

If the Manual Reactor Trip Function cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 additional hours (54 hours total time). The 6 additional hours are reasonable, based on operating experience, to reach MODE 3 from full power operation in an orderly manner and without challenging unit systems. With the unit in MODE 3, the MODES 1 and 2 requirements for this trip Function are no longer required and Condition C is entered.

C.1 and C.2

Condition C applies to the following reactor trip Functions in MODE 3, 4, or 5 with the RTBs closed and the CRD System capable of rod withdrawal:

- Manual Reactor Trip;
- RTBs;
- RTB Undervoltage and Shunt Trip Mechanisms; and
- Automatic Trip Logic.

This action addresses the train orientation of the SSPS for these Functions. With one channel or train inoperable, the inoperable channel or train must be restored to OPERABLE status within 48 hours. If the affected Function(s) cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be placed in a condition in which the requirement does not apply. To achieve this status, the RTBs must be opened within the next hour. The additional hour provides sufficient time to accomplish the action in an orderly manner. With the RTBs open, these Functions are no longer required.

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents.

The ESFAS instrumentation is segmented into three distinct but interconnected modules as identified below:

- Field transmitters or process sensors and instrumentation: provide a measurable electronic signal based on the physical characteristics of the parameter being measured;
- Signal processing equipment including analog protection system, field contacts, and protection channel sets: provide signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system devices, and control board/control room/miscellaneous indications; and
- Solid State Protection System (SSPS) including input, logic, and output bays: Initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable outputs from the signal process control and protection system.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. In many cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which is assumed to occur between calibrations, statistical allowances are provided in the NOMINAL TRIP SETPOINT and Allowable Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.

BACKGROUND (continued)

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with setpoints established by safety analyses. These setpoints are defined in UFSAR, Chapter 6 (Ref. 1), Chapter 7 (Ref. 2), and Chapter 15 (Ref. 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the SSPS for decision logic processing. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of- two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in the UFSAR.

Trip Setpoints and Allowable Values

The NOMINAL TRIP SETPOINTS are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION tolerance.

BASES

BACKGROUND (continued)

The NOMINAL TRIP SETPOINTS used in the bistables are based on the analytical limits (Ref. 1, 2, and 3). The selection of these NOMINAL TRIP SETPOINTS is such that adequate protection is provided when all sensor and processing time delays, calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5) are taken into account. The actual as-left setpoint of the bistable assures that the actual trip occurs before the Allowable Value is reached. The Allowable Value accounts for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the point at which the loop trips does not exceed the Allowable Value, the loop is considered OPERABLE.

A trip within the Allowable Value ensures that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

The determination of the NOMINAL TRIP SETPOINTS and Allowable Values listed in Table 3.3.2-1 incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each NOMINAL TRIP SETPOINT. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

9. Containment Pressure Control System Permissives

The Containment Pressure Control System (CPCS) protects the Containment Building from excessive depressurization by preventing inadvertent actuation or continuous operation of the Containment Spray and Containment Air Return Systems when containment pressure is at or less than the CPCS permissive setpoint. The control scheme of CPCS is comprised of eight independent control circuits (4 per train), each having a separate and independent pressure transmitter and current alarm module. Each pressure transmitter monitors the containment pressure and provides input to its respective current alarm. The current alarms are set to inhibit or terminate containment spray and containment air return fan operation when containment pressure falls below the setpoint. The alarm modules switch back to the permissive state (allowing the systems to operate) when containment pressure is greater than or equal to the setpoint.

This function must be OPERABLE in MODES 1, 2, 3, and 4 when there is sufficient energy in the primary and secondary sides to pressurize containment following a pipe break. In MODES 5 and 6, there is insufficient energy in the primary and secondary sides to significantly pressurize the containment.

The ESFAS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6).

ACTIONS

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.2-1. When the Required Channels in Table 3.3.2-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip

BASES

ACTIONS (continued)

setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

When the number of inoperable channels in a trip function exceed those specified in one or other related Conditions associated with a trip function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 should be immediately entered if applicable in the current MODE of operation.

A.1

Condition A applies to all ESFAS protection functions.

Condition A addresses the situation where one or more channels or trains for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.2-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

B.1, B.2.1 and B.2.2

Condition B applies to manual initiation of:

- SI;
- Containment Spray;
- Phase A Isolation; and
- Phase B Isolation.

This action addresses the train orientation of the SSPS for the functions listed above. If a channel or train is inoperable, 48 hours is allowed to return it to an OPERABLE status. Note that for containment spray and Phase B isolation, failure of one or both channels in one train renders the train inoperable. Condition B, therefore, encompasses both situations. The specified Completion Time is reasonable considering that there are two automatic actuation trains and another manual initiation train OPERABLE for each Function, and the low probability of an event occurring during this interval. If the train cannot be restored to OPERABLE status, the unit must be placed in a MODE in which the LCO does not apply. This is done by placing the unit in at least MODE 3 within an additional 6 hours (54 hours total time) and in MODE 5 within an additional 30 hours (84 hours total time). The allowable Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss of voltage or degraded voltage condition occurs in the switchyard. There are two LOP start signals, one for each 4.16 kV vital bus.

There is one undervoltage relay per phase connected in a two-out-of-three logic scheme on the 4160 V essential bus. For an actual loss of voltage to the bus, the normal incoming breaker is tripped, the 4160 volt essential bus is load shed, and the diesel generator breaker is closed provided the diesel generating unit has attained at least 95% speed.

There is one degraded voltage relay per phase connected in a two-out-of-three logic scheme. Once the undervoltage is detected, two time delay relays begin timing to verify the event is sustained. If the first timer completes its cycle, an alarm will be initiated in the control room. The second time delay relay is provided to allow additional time following the first time delay for the operators to improve voltage. If the undervoltage condition is still present when the second timing cycle is complete, the normal and standby incoming circuit breakers are tripped. The LOP start actuation is described in UFSAR, Section 8.3 (Ref. 1).

Trip Setpoints and Allowable Values

The NOMINAL TRIP SETPOINTS used in the relays are based on the analytical limits presented in UFSAR, Chapter 15 (Ref. 2). The selection of these NOMINAL TRIP SETPOINTS is such that adequate protection is provided when all sensor and processing time delays are taken into account.

The actual as-left setpoint of the relays is normally still more conservative than that required by the Allowable Value. If the measured setpoint does not exceed the Allowable Value, the relay is considered OPERABLE.

Setpoints adjusted in accordance with the Allowable Value ensure that the consequences of accidents will be acceptable, providing the unit is operated from within the LCOs at the onset of the accident and that the equipment functions as designed.

BASES

BACKGROUND (continued)

Allowable Values and NOMINAL TRIP SETPOINTS are specified for each Function in the LCO. The NOMINAL TRIP SETPOINTS are selected to ensure that the setpoint measured by the surveillance procedure does not exceed the Allowable Value if the relay is performing as required. A relay shall be OPERABLE if the point at which the relay trips is found equal to or more conservative than the Allowable Value. In the event a relay's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that relay must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted. Each Allowable Value and NOMINAL TRIP SETPOINT specified is more conservative than the analytical limit assumed in the transient and accident analyses in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in setpoint calculations (Ref. 3).

APPLICABLE SAFETY ANALYSES

The LOP DG start instrumentation is required for the Engineered Safety Features (ESF) Systems to function in any accident with a loss of offsite power. Its design basis is that of the ESF Actuation System (ESFAS).

Accident analyses credit the loading of the DG based on the loss of offsite power during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a loss of offsite power. The analyses assume a non-mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The required channels of LOP DG start instrumentation, in conjunction with the ESF systems powered from the DGs, provide unit protection in the event of any of the analyzed accidents discussed in Reference 2, in which a loss of offsite power is assumed.

The delay times assumed in the safety analysis for the ESF equipment include the 10 second DG start delay, and the appropriate sequencing delay, if applicable. The response times for ESFAS actuated equipment in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," include the appropriate DG loading and sequencing delay. The LOP DG start instrumentation channels satisfy Criterion 3 of 10 CFR 50.36 (Ref. 4).

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LCO

The LCO for LOP DG start instrumentation requires that three channels per bus of both the loss of voltage and degraded voltage Functions shall be OPERABLE in MODES 1, 2, 3, and 4 when the LOP DG start instrumentation supports safety systems associated with the ESFAS. In MODES 5 and 6, the three channels must be OPERABLE whenever the associated DG is required to be OPERABLE to ensure that the automatic start of the DG is available when needed. Loss of the LOP DG Start Instrumentation Function could result in the delay of safety systems initiation when required. This could lead to unacceptable consequences during accidents. During the loss of offsite power the DG powers the motor driven auxiliary feedwater pumps. Failure of these pumps to start would leave only one turbine driven pump, as well as an increased potential for a loss of decay heat removal through the secondary system.

APPLICABILITY

The LOP DG Start Instrumentation Functions are required in MODES 1, 2, 3, and 4 because ESF Functions are designed to provide protection in these MODES. Actuation in MODE 5 or 6 is required whenever the required DG must be OPERABLE so that it can perform its function on an LOP or degraded power to the vital bus.

ACTIONS

A channel shall be OPERABLE if the point at which the channel trips is found equal to or more conservative than the Allowable Value. In the event a channel's trip setpoint is found less conservative than the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. If plant conditions warrant, the trip setpoint may be set outside the NOMINAL TRIP SETPOINT calibration tolerance band as long as the trip setpoint is conservative with respect to the NOMINAL TRIP SETPOINT. If the trip setpoint is found outside of the NOMINAL TRIP SETPOINT calibration tolerance band and non-conservative with respect to the NOMINAL TRIP SETPOINT, the setpoint shall be re-adjusted.

Because the required channels are specified on a per bus basis, the Condition may be entered separately for each bus as appropriate.

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in the LCO. The Completion Time(s) of the inoperable channel(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

BASES

ACTIONS (continued)

A.1

Condition A applies to the LOP DG start Function with one loss of voltage or degraded voltage channel per bus inoperable.

If one channel is inoperable, Required Action A.1 requires that channel to be placed in trip within 6 hours. With a channel in trip, the LOP DG start instrumentation channels are configured to provide a one-out-of-two logic to initiate a trip of the incoming offsite power.

The specified Completion Time is reasonable considering the Function remains fully OPERABLE on every bus and the low probability of an event occurring during these intervals.

B.1

Condition B applies when more than one loss of voltage or more than one degraded voltage channel on a single bus is inoperable.

Required Action B.1 requires restoring all but one channel to OPERABLE status. The 1 hour Completion Time should allow ample time to repair most failures and takes into account the low probability of an event requiring an LOP start occurring during this interval.

C.1

Condition C applies to each of the LOP DG start Functions when the Required Action and associated Completion Time for Condition A or B are not met.

In these circumstances the Conditions specified in LCO 3.8.1, "AC Sources-Operating," or LCO 3.8.2, "AC Sources—Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

SURVEILLANCE REQUIREMENTS

SR 3.3.5.1

SR 3.3.5.1 is the performance of a TADOT. This test is performed every 31 days. The test checks trip devices that provide actuation signals directly, bypassing the analog process control equipment. For these tests, the relay NOMINAL TRIP SETPOINTS are verified and adjusted as necessary. The Frequency is based on the known reliability of the relays and controls and the multichannel redundancy available, and has been

BASES

SURVEILLANCE REQUIREMENTS (continued)

shown to be acceptable through operating experience.

Testing consists of voltage sensor relay testing only. Actuation of load shedding and time delay timers is not required.

SR 3.3.5.2

SR 3.3.5.2 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. The Frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

REFERENCES

1. UFSAR, Section 8.3.
2. UFSAR, Chapter 15.
3. Loss of Voltage Relay Setting Calculation, MCC-1381.05-00-0094.
4. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).