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November 14, 2002

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Document Control Desk

Subject: Duke Energy Corporation

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

License Amendment Request for
Technical Specification 3.3.2, Engineered Safety Feature Actuation System Instrumentation

Pursuant to 10 CFR 50.90, Duke Energy Corporation is submitting a license amendment request (LAR) for the McGuire Nuclear Station Facility Operating Licenses and Technical Specifications (TS). The purpose of this LAR is to make additions, make necessary corrections, make the descriptive portion of these TS easier to apply to plant activities, and delete a portion of this TS that is not required by regulations.[1] This LAR modifies the subject TS as summarized below.

1. Adds a new MODE 3 operability requirement within Engineered Safety Feature Actuation System (ESFAS) Function 5 (Turbine Trip and Feedwater Isolation) as shown on TS Table 3.3.2-1; reformats TS Table 3.3.2-1 in regard to ESFAS Function 5; modifies identified Functions, Conditions, and Required Actions applicable within ESFAS Function 5; and modifies the applicability of footnotes for ESFAS Function 5.

2. Deletes current ESFAS Function 5e (Dog House Water Level- High High).

[1] 10 CFR 50.36, "Technical specifications."

A001

3. Deletes the applicability of Footnote (a) to ESFAS Function 6e (Auxiliary Feedwater, Trip of all Main Feedwater Pumps).

Conforming changes will also be made to the Bases and are included for information.

The contents of this LAR submittal package are listed below.

- Attachment 1 contains marked copies of the affected TS and Bases pages, showing the proposed changes.
- Attachment 2 provides the reprinted TS and Bases pages.
- Attachment 3 provides a description of the proposed changes and technical justification.
- Pursuant to 10 CFR 50.92, Attachment 4 documents Duke's determination that this LAR contains No Significant Hazards Consideration.
- Pursuant to 10 CFR 51.22(c)(9), Attachment 5 provides the basis for the categorical exclusion from performing an Environmental Assessment/Impact Statement.

Implementation of this proposed amendment to the McGuire Facility Operating Licenses and TS will require revision to Chapter 7, "Instrumentation and Controls;" and Chapter 16, "Selected Licensee Commitments," of the plant's Updated Final Safety Analysis Report (UFSAR). The necessary revisions are discussed in Attachment 3 and will be made in accordance with the applicable regulation.[2]

Duke is requesting review and approval of this LAR at the NRC's earliest opportunity. This LAR addresses a non-conservative situation that currently exists with the lack of a MODE 3 operability requirement within ESFAS Function 5 of TS 3.3.2. Duke has determined that the NRC's standard 30-day implementation period is acceptable for this LAR.

In accordance with Duke administrative procedures and Quality Assurance Program Topical Report, the changes contained in this LAR have been reviewed and approved by the

[2] 10 CFR 50.71, "Maintenance of records, making of reports."

McGuire Plant Operations Review Committee and the Duke Nuclear Safety Review Board. Pursuant to 10 CFR 50.91, a copy of this LAR is being sent to the appropriate official of the State of North Carolina.

This submittal document contains these commitments:

1. Duke will implement this LAR within the NRC's standard 30-day grace period.

2. Duke will make the necessary revisions to Chapters 7 and 16 of the McGuire UFSAR (as described in Attachment 3) in accordance with the applicable regulation[2].

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

Very truly yours,

M. S. Tuckman

M. S. Tuckman

Attachments

xc w/Attachments:

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M. S. Tuckman, affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

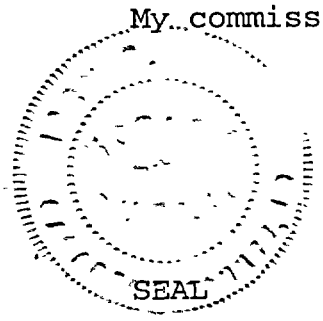
M. S. Tuckman

M. S. Tuckman, Executive Vice President

Subscribed and sworn to me: Nov 14, 2002
Date

Mary P. Helms, Notary Public

My commission expires: JAN 22, 2006
Date



bxc w/Attachments:

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NRIA File/ELL
McGuire Master File - Mail Code MG01DM

Attachment 1

McGuire Units 1 and 2 Technical Specifications

Marked Copy

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| J. One channel inoperable. | J.1 ----------NOTE---------- One channel may be bypassed for up to 4 hours for surveillance testing. ---------- Place channel in trip. | 6 hours |
| | OR | |
| | J.2 Be in MODE 3. | 12 hours |
| K. One Main Feedwater Pumps trip channel inoperable. | K.1 Place channel in trip. | 1 hours |
| | OR | |
| | K.2 Be in MODE 3. | 7 hours |
| L. One required channel in one train of Doghouse Water Level-High High inoperable. | L.1 Restore the inoperable train to OPERABLE status. | 72 hours |
| | OR | |
| | L.2 Perform continuous monitoring of Doghouse water level. | 73 hours |
| M. Two trains of Doghouse Water Level-High High inoperable. | M.1 Perform continuous monitoring of Doghouse water level. | 1 hour |

Not used.

Not used.

(continued)

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<br>SR 3.3.2.5<br>SR 3.3.2.8<br>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<br>SR 3.3.2.4<br>SR 3.3.2.6 | NA | NA |
| b. SG Water Level - High High (P-14) Replace With INSERT M1 | 1,2[e] | 3 per SG | J | SR 3.3.2.1<br>SR 3.3.2.2<br>SR 3.3.2.4<br>SR 3.3.2.5<br>SR 3.3.2.6<br>SR 3.3.2.8<br>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<br>SR 3.3.2.5<br>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<br>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<br>SR 3.3.2.4<br>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<br>SR 3.3.2.5<br>SR 3.3.2.8<br>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.

# INSERT M1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5. | Turbine Trip and Feedwater Isolation | | | | | | |
| | a. Turbine Trip | | | | | | |
| | (1) Automatic Actuation Logic and Actuation Relays | 1,2 | 2 trains | I | SR 3 3 2.2<br>SR 3.3 2 4<br>SR 3.3 2.6 | NA | NA |
| | (2) SG Water Level- High High (P-14) | 1,2 | 3 per SG | J | SR 3 3 2.1<br>SR 3.3.2 2<br>SR 3 3.2.4<br>SR 3 3.2.5<br>SR 3 3.2.6<br>SR 3.3 2 8<br>SR 3.3.2.9 | ≤ 85 6% | 83.9% |
| | (3) Safety Injection | Refer to Function 1 (Safety Injection) for all initiation functions and requirements. See Item 5 a.(1) for Applicable MODES. | | | | | |
| | b Feedwater Isolation | | | | | | |
| | (1) Automatic Actuation Logic and Actuation Relays | $1,2^{(e)},3^{(e)}$ | 2 trains | H | SR 3.3 2.2<br>SR 3.3 2.4<br>SR 3 3 2.6 | NA | NA |
| | (2) SG Water Level- High High (P-14) | $1,2^{(e)},3^{(e)}$ | 3 per SG | D | SR 3 3.2.1<br>SR 3 3.2.2<br>SR 3.3 2.4<br>SR 3.3 2 5<br>SR 3.3.2.6<br>SR 3.3 2.8<br>SR 3 3 2.9 | ≤ 85.6% | 83.9% |
| | (3) Safety Injection | Refer to Function 1 (Safety Injection) for all initiation functions and requirements. See Item 5 b (1) for Applicable MODES. | | | | | |
| | (4) Tavg-Low | $1,2^{(e)}$ | 1 per loop | J | SR 3 3.2.1<br>SR 3 3.2.5<br>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. | | | | | |

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<br>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<br>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<br>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<br>SR 3 3.2.8<br>SR 3 3.2.9 | ≥ 3 psig | 3.5 psig |
| 7. Automatic Switchover to Containment Sump | | | | | | |
| a. Refueling Water Storage Tank (RWST) Level - Low | 1,2,3 | 3 | P, S | SR 3.3.2.1<br>SR 3 3.2.3<br>SR 3 3.2.8<br>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.

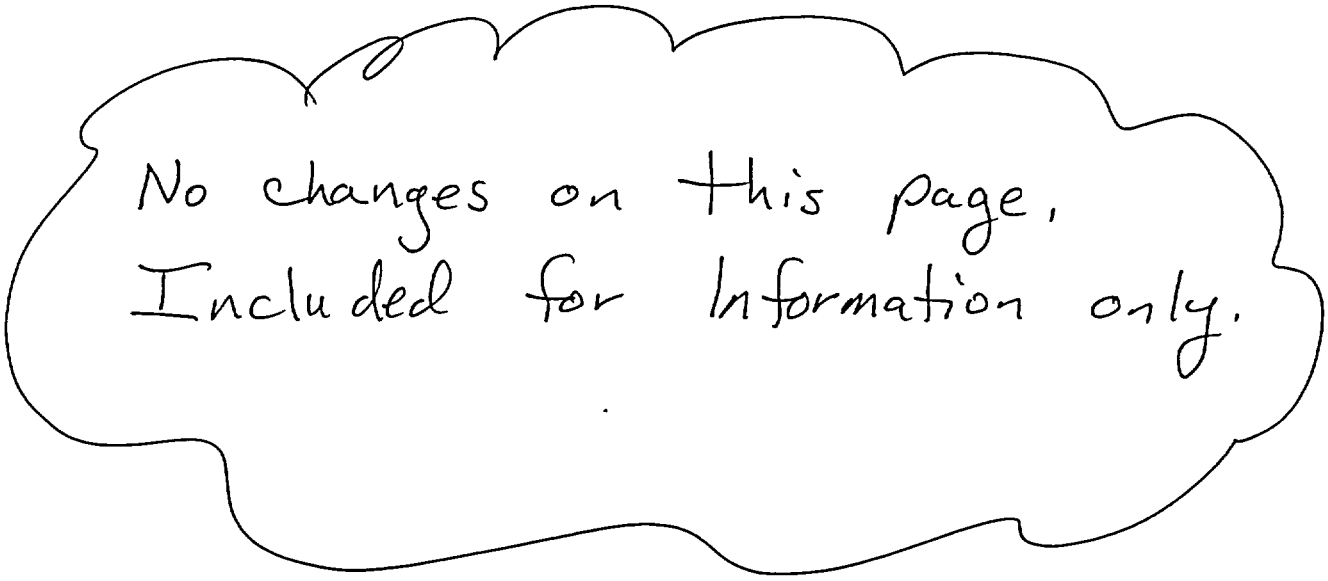
Table 3 3 2-1 (page 5 of 6)
Engineered Safety Feature Actuation System Instrumentation

| 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<br>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<br>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<br>SR 3.3.2.3<br>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 |

14

Table 3.3.2-1 (Page 6 of 6)
Engineered Safety Features Actuation System Instrumentation

NOTE 1: The Trip Setpoint for the Containment Pressure Control System start permissive/termination (SP/T) shall be $\geq$ 0.3 psig and $\leq$ 0.4 psig. The allowable value for the SP/T shall be $\geq$ 0.25 psig and $\leq$ 0.45 psig.



BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

MODES 2 and 3 unless all MSIVs are closed and de-activated. In MODES 4, 5, and 6, there is insufficient energy in the primary and secondary sides to have an SLB or other accident that would result in a release of significant enough quantities of energy to cause a cooldown of the RCS.

5. Turbine Trip and Feedwater Isolation

The primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, and to stop the excessive flow of feedwater into the SGs. These Functions are necessary to mitigate the effects of a high water level in the SGs, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. The SG high water level is due to excessive feedwater flows.

The function is actuated when the level in any SG exceeds the high high setpoint, and performs the following functions:

- Trips the main turbine;
- Trips the MFW pumps; and
- Initiates feedwater isolation (shuts the MFW control valves, bypass feedwater control valves, feedwater isolation valves, and the MFW to AFW nozzle bypass valves).

Turbine Trip and Feedwater Isolation signals are both actuated by SG Water Level-High High, or by an SI signal. The RTS also initiates a turbine trip signal whenever a reactor trip (P-4) is generated. A Feedwater Isolation signal is also generated on a high water level in the reactor building doghouses. In the event of SI, the unit is taken off line and the turbine generator must be tripped. The MFW System is also taken out of operation and the AFW System is automatically started. The SI signal was discussed previously.

a. Turbine Trip and Feedwater Isolation-Automatic Actuation Logic and Actuation Relays

Automatic Actuation Logic and Actuation Relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

Replace with INSERT M2

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

b. Turbine Trip and Feedwater Isolation-Steam Generator Water Level-High High (P-14)

This signal provides protection against excessive feedwater flow. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic 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. Only three protection channels are necessary to satisfy the protective requirements. The setpoints are based on percent of narrow range instrument span.

c. Turbine Trip and Feedwater Isolation-Safety Injection

Turbine Trip and Feedwater Isolation is also initiated by all Functions that initiate SI. The Feedwater Isolation Function requirements for these Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements.

d. Turbine Trip and Feedwater Isolation - RCS $T_{avg}$ - Low Coincident with Reactor Trip (P-4)

This signal only initiates a Feedwater Isolation. The signal provides protection against excessive cooldown, which could subsequently introduce a positive reactivity excursion after a plant trip. There are four channels of RCS $T_{avg}$ - Low (one per loop), with a two-out-of-four logic required coincident with a reactor trip signal (P-4) to initiate a feedwater isolation. The P-4 interlock is discussed in Function 8.a.

e. Turbine Trip and Feedwater Isolation - Doghouse Water Level - High High

This signal initiates a Feedwater Isolation. The signal terminates forward feedwater flow in the event of a postulated pipe break in the main feedwater piping in the doghouses to prevent flooding safety related equipment essential to the safe shutdown of the plant. The level

Replace with INSERT M2

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Replace with INSERT M2

instrumentation consists of six level switches (three per train) in each of the two reactor building doghouses. A high-high level detected by two-out-of-three switches in either train in the inboard or outboard doghouse will initiate a feedwater isolation. This signal initiates Feedwater Isolation for the specific doghouse where the High-High level is detected and trips both main feedwater pumps thus causing a main turbine trip.

Turbine Trip and Feedwater Isolation Functions must be OPERABLE in MODES 1 and 2 except when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve when the MFW System is in operation and the turbine generator may be in operation. In MODES 3, 4, 5, and 6, the MFW System and the turbine generator are not in service and this Function is not required to be OPERABLE.

6. Auxiliary Feedwater

The AFW System is designed to provide a secondary side heat sink for the reactor in the event that the MFW System is not available. The system has two motor driven pumps and a turbine driven pump, making it available during normal and accident operation. The normal source of water for the AFW System is the condensate storage system (not safety related). A low suction pressure to the AFW pumps will automatically realign the pump suctions to the Nuclear Service Water System (NSWS)(safety related). The AFW System is aligned so that upon a pump start, flow is initiated to the respective SGs immediately.

a. Auxiliary Feedwater-Automatic Actuation Logic and Actuation Relays

Automatic actuation logic and actuation relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

b. Auxiliary Feedwater-Steam Generator Water Level-Low Low

SG Water Level-Low Low provides protection against a loss of heat sink. A feed line break, inside or outside of containment, or a loss of MFW, would result in a loss of SG water level. SG Water Level-Low Low provides input to the

**INSERT M2 – Page 1 of 3**

5. Turbine Trip and Feedwater Isolation

The primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, stop the excessive flow of feedwater into the SGs, and to limit the energy released into containment. These Functions are necessary to mitigate the effects of a high water level in the SGs, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. The SG high water level is due to excessive feedwater flows. Feedwater Isolation serves to limit the energy released into containment upon a feedwater line or steam line break inside containment.

The Functions are actuated when the level in any SG exceeds the high high setpoint, and performs the following functions:

- Trips the main turbine;
- Trips the MFW pumps; and
- Initiates feedwater isolation (shuts the MFW control valves, bypass feedwater control valves, feedwater isolation valves, and the MFW to AFW nozzle bypass valves).

Turbine Trip and Feedwater Isolation signals are both actuated by SG Water Level-High High, or by an SI signal. The RTS also initiates a turbine trip signal whenever a reactor trip (P-4) is generated. A Feedwater Isolation signal is generated by a reactor trip (P-4) coincident with $T_{avg}$-Low. The MFW System is also taken out of operation and the AFW System is automatically started. The SI signal was discussed previously.

a. Turbine Trip

(1) Turbine Trip-Automatic Actuation Logic and Actuation Relays

Automatic Actuation Logic and Actuation Relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

(2) Turbine Trip-Steam Generator Water Level-High High (P-14)

This signal prevents damage to the turbine due to water in the steam lines. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic 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. Only three protection channels are necessary to satisfy the protective requirements. The setpoints are based on percent of narrow range instrument span.

(3) Turbine Trip-Safety Injection

Turbine Trip is also initiated by all Functions that initiate SI. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements. Item 5.a.(1) is referenced for the applicable MODES.

The Turbine Trip Function must be OPERABLE in MODES 1 and 2. In lower MODES, the turbine generator is not in service and this Function is not required to be OPERABLE.

b. Feedwater Isolation

(1) Feedwater Isolation-Automatic Actuation Logic and Actuation Relays

Automatic Actuation Logic and Actuation Relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

**INSERT M2 – Page 3 of 3**

(2) Feedwater Isolation-Steam Generator Water Level-High High (P-14)

This signal provides protection against excessive feedwater flow. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic 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. Only three protection channels are necessary to satisfy the protective requirements. The setpoints are based on percent of narrow range instrument span.

(3) Feedwater Isolation-Safety Injection

Feedwater Isolation is also initiated by all Functions that initiate SI. The Feedwater Isolation Function requirements for these Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements. Item 5.b.(1) is referenced for the applicable MODES.

(4) Feedwater Isolation - RCS $T_{avg}$- Low coincident with Reactor Trip (P-4)

This signal provides protection against excessive cooldown, which could subsequently introduce a positive reactivity excursion after a plant trip. There are four channels of RCS $T_{avg}$ - Low (one per loop), with a two-out-of-four logic required coincident with a reactor trip signal (P-4) to initiate a feedwater isolation. The P-4 interlock is discussed in Function 8.a.

The Feedwater Isolation Function must be OPERABLE in MODES 1 and 2 and also in MODE 3 (except for the functions listed in Table 3.3.2-1). Feedwater Isolation is not required OPERABLE when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or feedwater is isolated by a closed manual valve. In lower MODES, the MFW System is not in service and this Function is not required to be OPERABLE.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

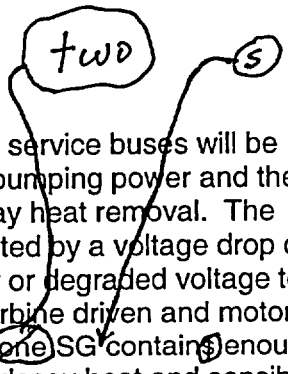
SG Level Control System. Therefore, the actuation logic must be able to withstand both an input failure to the control system which may then require a protection function actuation and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with two-out-of-four logic. The setpoints are based on percent of narrow range instrument span.

SG Water Level - Low Low in any operating SG will cause the motor driven AFW pumps to start. The system is aligned so that upon a start of the pump, water immediately begins to flow to the SGs. SG Water Level - Low Low in any two operating SGs will cause the turbine driven pumps to start.

c. Auxiliary Feedwater-Safety Injection

An SI signal starts the motor driven AFW pumps. The AFW initiation functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating functions and requirements.

d. Auxiliary Feedwater-Station Blackout




A loss of power or degraded voltage to the service buses will be accompanied by a loss of reactor coolant pumping power and the subsequent need for some method of decay heat removal. The loss of power or degraded voltage is detected by a voltage drop on each essential service bus. Loss of power or degraded voltage to either essential service bus will start the turbine driven and motor driven AFW pumps to ensure that at least one SG contains enough water to serve as the heat sink for reactor decay heat and sensible heat removal following the reactor trip. The turbine driven pump does not start on a loss of power coincident with a SI signal.

Functions 6.a through 6.d must be OPERABLE in MODES 1, 2, and 3 to ensure that the SGs remain the heat sink for the reactor. These Functions do not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink. In MODE 4, AFW actuation does

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

not need to be OPERABLE because either AFW or residual heat removal (RHR) will already be in operation to remove decay heat or sufficient time is available to manually place either system in operation.

e. Auxiliary Feedwater-Trip of All Main Feedwater Pumps

A Trip of all MFW pumps is an indication of a loss of MFW and the subsequent need for some method of decay heat and sensible heat removal to bring the reactor back to no load temperature and pressure. Two contacts are provided in series (one from each MFW pump) in the starting circuit for each AFW pump. A trip of all MFW pumps closes both contacts and starts the motor driven AFW pumps to ensure that at least one SG is available with water to act as the heat sink for the reactor. This function must be OPERABLE in MODES 1 and 2. This ensures that at least one SG is provided with water to serve as the heat sink to remove reactor decay heat and sensible heat in the event of an accident. In MODES 3, 4, and 5, the MFW pumps are normally shut down, and thus neither pump trip is indicative of a condition requiring automatic AFW initiation.

two SGs are

f. Auxiliary Feedwater-Pump Suction Transfer on Suction Pressure-Low

A low pressure signal in the AFW pump suction line protects the AFW pumps against a loss of the normal supply of water for the pumps, the condensate storage system. Two pressure switches per train are located on the AFW pump suction line from the condensate storage system. The turbine driven AFW pump has a total of four switches. A low pressure signal sensed by two-out-of-two switches on either train will cause the emergency supply of water for the pump to be aligned. The NSWS (safety grade) is then lined up to supply the AFW pumps to ensure an adequate supply of water for the AFW System to maintain at least one of the SGs as the heat sink for reactor decay heat and sensible heat removal.

two

This Function must be OPERABLE in MODES 1, 2, and 3 to ensure a safety grade supply of water for the AFW System to maintain the SGs as the heat sink for the reactor. This Function does not have to be OPERABLE in MODES 5

BASES

ACTIONS (continued)

- Steam Line Pressure-Negative Rate-High;
- Loss of offsite power and
- SG Water level-Low Low; and

• SG Water Level - High High (P-14) for the Feedwater Isolation Function;

If one channel is inoperable, 6 hours are allowed to restore the channel to OPERABLE status or to place it in the tripped condition. Generally this Condition applies to functions that operate on two-out-of-three logic. Therefore, failure of one channel places the Function in a two-out-of-two configuration. One channel must be tripped to place the Function in a one-out-of-two configuration that satisfies redundancy requirements.

Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 6 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours.

The allowed 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. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows the inoperable channel to be bypassed for up to 4 hours for surveillance testing of other channels. The note also allows an OPERABLE channel to be placed in bypass without entering the Required Actions for up to 4 hours for testing of the bypassed channel. However, only one channel may be placed in bypass at any one time. The 6 hours allowed to restore the channel to OPERABLE status or to place the inoperable channel in the tripped condition, and the 4 hours allowed for testing, are justified in Reference 7.

E.1, E.2.1, and E.2.2

Condition E applies to:

- Containment Spray Containment Pressure - High High;
- Containment Phase B Isolation Containment Pressure - High-High, and
- Steam Line Isolation Containment Pressure - High High.

BASES

ACTIONS (continued)

For the Manual Initiation and the P-4 Interlock Functions, this action addresses the train orientation of the SSPS. If a train or channel is inoperable, 48 hours is allowed to return it to OPERABLE status. The specified Completion Time is reasonable considering the nature of these Functions, the available redundancy, and the low probability of an event occurring during this interval. If the Function cannot be returned to OPERABLE status, the unit must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power in an orderly manner and without challenging unit systems. In MODE 4, the unit does not have any analyzed transients or conditions that require the explicit use of the protection functions noted above.

G.1 and G.2

Condition G applies to manual initiation of Steam Line Isolation.

This action addresses the operability of the manual steam line isolation function for each individual main steam isolation valve. If a channel is inoperable, 48 hours is allowed to return it to an OPERABLE status. If the train cannot be restored to OPERABLE status, the Conditions and Required Actions of LCO 3.7.2, "Main Steam Isolation Valves," must be entered for the associated inoperable valve. The specified Completion Time is reasonable considering that there is a system level manual initiation train for this Function and the low probability of an event occurring during this interval.

H.1, H.2.1 and H.2.2 , Feedwater Isolation,

Condition H applies to the automatic actuation logic and actuation relays for the Steam Line Isolation and AFW actuation Functions.

The action addresses the train orientation of the SSPS and the master and slave relays for these functions. If one train is inoperable, 6 hours are allowed to restore the train to OPERABLE status. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. If the train cannot be returned to OPERABLE status, the unit must be brought to MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly

BASES

ACTIONS (continued)

manner and without challenging unit systems. Placing the unit in MODE 4 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. This allowance is based on the reliability analysis (Ref. 7) assumption that 4 hours is the average time required to perform channel surveillance.

I.1 and I.2

Condition I applies to the automatic actuation logic and actuation relays for the Turbine Trip and Feedwater Isolation Function.

This action addresses the train orientation of the SSPS and the master and slave relays for this Function. If one train is inoperable, 6 hours are allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the following 6 hours. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. These Functions are no longer required in MODE 3. Placing the unit in MODE 3 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. This allowance is based on the reliability analysis (Ref. 7) assumption that 4 hours is the average time required to perform channel surveillance.

for the Turbine Trip Function; and

J.1 and J.2

Condition J applies to SG Water Level-High High (P-14)

- $T_{avg}$ - Low.

BASES

ACTIONS (continued)

If one channel is inoperable, 6 hours are allowed to restore one channel to OPERABLE status or to place it in the tripped condition. If placed in the tripped condition, the Function is then in a partial trip condition where one-out-of-two logic will result in actuation. The 6 hour Completion Time is justified in Reference 7. Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 6 hours requires the unit to be placed in MODE 3 within the following 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows the inoperable channel to be bypassed for up to 4 hours for surveillance testing of other channels. The note also allows an OPERABLE channel to be placed in bypass without entering the Required Actions for up to 4 hours for testing of the bypassed channel. However, only one channel may be placed in bypass at any one time. The 6 hours allowed to place the inoperable channel in the tripped condition, and the 4 hours allowed for a channel to be in the bypassed condition for testing, are justified in Reference 7.

K.1 and K.2

Condition K applies to the AFW pump start on trip of all MFW pumps.

This action addresses the relay contact orientation for the auto start function of the AFW System on loss of all MFW pumps. The OPERABILITY of the AFW System must be assured by allowing automatic start of the AFW System pumps. If a channel is inoperable,
1 hour is allowed to place the channel in trip. If placed in the tripped condition, the function is then in a partial trip condition where a one-out-of-one logic will result in actuation. If the channel is not placed in trip within 1 hour, 6 hours are allowed to place the unit in MODE 3. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, the unit does not have any analyzed transients or conditions that require the explicit use of the protection function noted above.

L.1

Condition L applies to the Doghouse Water Level - High High.

Not used.

BASES

ACTIONS (continued)

The failure of one required channel in one train in either reactor building doghouse results in a loss of redundancy for the function. The function can still be initiated by the remaining operable train. The inoperable train is required to be restored to OPERABLE status within 72 hours, or continuous visual monitoring of the doghouse water level must be implemented in the following hour.

The allowed Completion Time is reasonable considering that the redundant train remains OPERABLE to initiate the function if required.

Not Used

M.1, M.2.1 and M.2.2

Condition M applies to the Doghouse Water Level - High High.

The failure of two trains in either reactor building doghouse results in a loss of the function. Continuous visual monitoring of the doghouse water level must be implemented in the following hour.

The allowed Completion Time provides sufficient time for the operating staff to establish the required monitoring.

N.1 and N.2

Condition N applies to the Auxiliary Feedwater Pumps Suction Transfer on Suction Pressure Low.

If one or more channels on a single AFW pump is inoperable, 48 hours is allowed to restore the channel(s) to OPERABLE status or to declare the associated AFW pump inoperable. The failure of one or more channels on one pump disables the ability for the suction transfer on that pump.

The allowed Completion Times are reasonable, considering the remaining redundant pumps and transfer instrumentation.

O.1

Condition O applies to the Auxiliary Feedwater Pumps Suction Transfer on Suction Pressure Low.

If one or more channels on more than one AFW pumps are inoperable, the ability for the suction transfer has been lost on multiple pumps. In

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.3

SR 3.3.2.3 is the performance of a COT on the RWST level and Containment Pressure Control Start and Terminate Permissives.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found within the Allowable Values specified in Table 3.3.2-1. This test is performed every 31 days. The Frequency is adequate, based on operating experience, considering instrument reliability and operating history data.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 31 days on a STAGGERED TEST BASIS. The time allowed for the testing (4 hours) and the surveillance interval are justified in Reference 7.

SR 3.3.2.5 is the performance of a COT.

A COT is performed on each required channel to ensure the channel will perform the intended Function. The tested portion of the loop must trip within the Allowable Values specified in Table 3.3.2-1.

The setpoint shall be left set consistent with the assumptions of the setpoint methodology.

The Frequency of 92 days is justified in Reference 7.

SR 3.3.2.5

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.6

SR 3.3.2.6 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation MODE is either allowed to function, or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation MODE is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 92 days. The Frequency is adequate, based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.2.7

SR 3.3.2.7 is the performance of a TADOT. This test is a check of the Manual Actuation Functions, AFW pump start, Reactor Trip (P-4) Interlock and Doghouse Water Level-High High feedwater isolation. It is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.). The Frequency is adequate, based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation Functions. The manual initiation Functions have no associated setpoints.

SR 3.3.2.8

SR 3.3.2.8 is the performance of a CHANNEL CALIBRATION.

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 measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month

Attachment 2

McGuire Units 1 and 2 Technical Specifications

Reprinted Pages

| Remove | Insert |
|---|---|
| 3.3.2-5 | 3.3.2-5 |
| 3.3.2-10<br>thru<br>3.3.2-15 | 3.3.2-10<br>thru<br>3.3.2-14 |
| B3.3.2-18<br>thru<br>B3.3.2-43 | B3.3.2-18<br>thru<br>B3.3.2-43 |

ACTIONS (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| J. One channel inoperable. | J.1 ----------NOTE---------- One channel may be bypassed for up to 4 hours for surveillance testing. ---------- Place channel in trip. | 6 hours |
| | OR | |
| | J.2 Be in MODE 3. | 12 hours |
| K. One Main Feedwater Pumps trip channel inoperable. | K.1 Place channel in trip. | 1 hours |
| | OR | |
| | K.2 Be in MODE 3. | 7 hours |
| L. Not Used | | |
| M. Not Used | | |

(continued)

Table 3.3 2-1 (page 1 of 5)
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<br>SR 3 3.2.4<br>SR 3 3.2.6 | NA | NA |
| c. Containment Pressure - High | 1,2,3 | 3 | D | SR 3 3 2.1<br>SR 3 3 2.5<br>SR 3 3 2.8<br>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<br>SR 3 3 2.5<br>SR 3 3 2.8<br>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<br>SR 3 3 2 4<br>SR 3 3 2 6 | NA | NA |
| c. Containment Pressure - High High | 1,2,3 | 4 | E | SR 3.3 2.1<br>SR 3 3 2.5<br>SR 3 3 2.8<br>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<br>SR 3.3 2.4<br>SR 3 3 2.6 | NA | NA |

(continued)

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

Table 3.3 2-1 (page 2 of 5)
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<br>SR 3.3 2 4<br>SR 3 3 2.6 | NA | NA |
| (3) Containment Pressure - High High | 1,2,3 | 4 | E | SR 3 3 2 1<br>SR 3 3 2 5<br>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<br>SR 3 3 2 4<br>SR 3.3 2 6 | NA | NA |
| c Containment Pressure - High High | 1,2(b), 3(b) | 4 | E | SR 3.3 2.1<br>SR 3 3 2.5<br>SR 3 3 2.8<br>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<br>SR 3 3 2.5<br>SR 3 3 2.8<br>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 5)
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<br>SR 3 3 2.5<br>SR 3 3 2.8<br>SR 3 3 2.9 | ≤ 120[d] psi | 100[d] psi |
| 5. Turbine Trip and Feedwater Isolation | | | | | | |
| a. Turbine Trip | 1,2 | 2 trains | I | SR 3 3 2 2<br>SR 3 3 2.4<br>SR 3.3 2 6 | NA | NA |
| (1) Automatic Actuation Logic and Actuation Relays | | | | | | |
| (2) SG Water Level-High High (P-14) | 1,2 | 3 per SG | J | SR 3 3 2.1<br>SR 3 3.2 2<br>SR 3.3.2.4<br>SR 3.3 2.5<br>SR 3.3 2.6<br>SR 3 3 2.8<br>SR 3 3 2.9 | ≤ 85 6% | 83 9% |
| (3) Safety Injection | Refer to Function 1 (Safety Injection) for all initiation functions and requirements for Applicable MODES | | | | See item 5 a.(1) | |
| b Feedwater Isolation | | | | | | |
| (1) Automatic Actuation Logic and Actuation Relays | 1,2[e], 3[e] | 2 trains | H | SR 3 3 2.2<br>SR 3 3 2.4<br>SR 3 3 2.6 | NA | NA |
| (2) SG Water Level-High High (P-14) | 1,2[e], 3[e] | 3 per SG | D | SR 3 3 2 1<br>SR 3 3 2 2<br>SR 3.3 2 4<br>SR 3.3 2.5<br>SR 3 3 2.6<br>SR 3 3 2.8<br>SR 3 3 2.9 | ≤ 85.6 | 83 9% |

(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 5)
Engineered Safety Feature Actuation System Instrumentation

| FUNCTION | APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS | REQUIRED CHANNELS | CONDITIONS | SURVEILLANCE REQUIREMENTS | ALLOWABLE VALUE | NOMINAL TRIP SETPOINT |
|---|---|---|---|---|---|---|
| 5. Turbine Trip and Feedwater Isolation (continued) | | | | | | |
| (3) Safety Injection | Refer to Function 1 (Safety Injection) for all initiation functions and requirements 5 b (1) for Applicable MODES | | | | See Item | |
| (4) Tavg-Low | 1,2(e) | 1 per loop | J | SR 3 3 2.1<br>SR 3 3 2 5<br>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. | | | | | |
| 6 Auxiliary Feedwater | | | | | | |
| a Automatic Actuation Logic and Actuation Relays | 1,2,3 | 2 trains | H | SR 3 3 2 2<br>SR 3 3 2 4<br>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<br>SR 3.3 2.5<br>SR 3.3 2.8<br>SR 3 3 2.9 | ≥ 15% | 16 7% |
| 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<br>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<br>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 |

(continued)

(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 5 of 5)
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) | | | | | | |
| | e. Trip of all Main Feedwater Pumps | 1,2 | 1 per MFW pump | K | SR 3.3.2.7<br>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<br>SR 3 3 2 8<br>SR 3 3 2 9 | ≥ 3 psig | 3 5 psig |
| 7. | Automatic Switchover to Containment Sump | | | | | | |
| | a Refueling Water Storage Tank (RWST) Level - Low | 1,2,3 | 3 | P,S | SR 3 3 2 1<br>SR 3 3 2 3<br>SR 3.3 2 8<br>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 | | | | | |
| 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<br>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<br>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<br>SR 3 3 2.3<br>SR 3 3 2.8 | Refer to Note 1 on Page 3.3 2-14 | Refer to Note 1 on page 3 3 2-14 |

NOTE 1: The Trip Setpoint for the Containment Pressure Control System start permissive/termination (SP/T) shall be ≥ 0.3 psig and ≤ 0.4 psig. The allowable value for the SP/T shall be ≥ 0.25 psig and ≤ 0.45 psig.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

MODES 2 and 3 unless all MSIVs are closed and de-activated. In MODES 4, 5, and 6, there is insufficient energy in the primary and secondary sides to have an SLB or other accident that would result in a release of significant enough quantities of energy to cause a cooldown of the RCS.

5. Turbine Trip and Feedwater Isolation

The primary functions of the Turbine Trip and Feedwater Isolation signals are to prevent damage to the turbine due to water in the steam lines, stop the excessive flow of feedwater into the SGs, and to limit the energy released into containment. These Functions are necessary to mitigate the effects of a high water level in the SGs, which could result in carryover of water into the steam lines and excessive cooldown of the primary system. The SG high water level is due to excessive feedwater flows. Feedwater isolation serves to limit the energy released into containment upon a feedwater line or steam line break inside containment.

The Functions are actuated when the level in any SG exceeds the high high setpoint, and performs the following functions:

- Trips the main turbine;
- Trips the MFW pumps; and
- Initiates feedwater isolation (shuts the MFW control valves, bypass feedwater control valves, feedwater isolation valves, and the MFW to AFW nozzle bypass valves).

Turbine Trips and Feedwater Isolation signals are both actuated by SG Water Level-High High, or by an SI signal. The RTS also initiates a turbine trip signal whenever a reactor trip (P-4) is generated. A Feedwater Isolation signal is also generated by a reactor trip (P-4) coincident with $T_{avg}$-Low. The MFW System is also taken out of operation and the AFW System is automatically started. The SI signal was discussed previously.

a. Turbine Trip

(1) Turbine Trip-Automatic Actuation Logic and Actuation Relays

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Automatic Actuation Logic and Actuation Relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

(2) Turbine Trip-Steam Generator Water Level-High High (P-14)

This signal prevents damage to the turbine due to water in the steam lines. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic 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. Only three protection channels are necessary to satisfy the protective requirements. The setpoints are based on percent of narrow range instrument span.

(3) Turbine Trip-Safety Injection

Turbine Trip is also initiated by all Functions that initiate SI. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements. Item 5.a.(1) is referenced for the applicable MODES.

The Turbine Trip Function must be OPERABLE in MODES 1 and 2. In lower MODES, the turbine generator is not in service and this Function is not required to be OPERABLE.

b. Feedwater Isolation

(1) Feedwater Isolation-Automatic Actuation Logic and Actuation Relays

Automatic Actuation Logic and Actuation Relays consist of the same features and operate in the same APPLICABLE manner as described for ESFAS Function 1.b.

BASES

SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

(2) Feedwater Isolation-Steam Generator Water Level-High High (P-14)

This signal provides protection against excessive feedwater flow. The ESFAS SG water level instruments provide input to the SG Water Level Control System. Therefore, the actuation logic 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. Only three protection channels are necessary to satisfy the protective requirements. The setpoints are based on percent of narrow range instrument span.

(3) Feedwater Isolation-Safety Injection

Feedwater Isolation is also initiated by all Functions that initiate SI. The Feedwater Isolation Function requirements for these Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead Function 1, SI, is referenced for all initiating functions and requirements. Item 5.b.(1) is referenced for the applicable MODES.

(4) Feedwater Isolation – RCS $T_{avg}$-Low Coincident With Reactor Trip (P-4)

This signal provides protection against excessive cooldown, which could subsequently introduce a positive reactivity excursion after a plant trip. There are four channels of RCS $T_{avg}$-Low (one per loop), with a two-out-of-four logic required coincident with a reactor trip signal (P-4) to initiate a feedwater isolation. The P-4 interlock is discussed in Function 8.a.

The Feedwater Isolation Function must be OPERABLE in MODES 1 and 2 and also in MODE 3 (except for the functions listed in Table 3.3.2-1). Feedwater Isolation is not required OPERABLE when all MFIVs, MFCVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve. In lower MODES, the MFW System is not in service and this Function is not required to be OPERABLE.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

6. Auxiliary Feedwater

The AFW System is designed to provide a secondary side heat sink for the reactor in the event that the MFW System is not available. The system has two motor driven pumps and a turbine driven pump, making it available during normal and accident operation. The normal source of water for the AFW System is the condensate storage system (not safety related). A low suction pressure to the AFW pumps will automatically realign the pump suctions to the Nuclear Service Water System (NSWS)(safety related). The AFW System is aligned so that upon a pump start, flow is initiated to the respective SGs immediately.

a. Auxiliary Feedwater-Automatic Actuation Logic and Actuation Relays

Automatic actuation logic and actuation relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

b. Auxiliary Feedwater-Steam Generator Water Level-Low Low

SG Water Level-Low Low provides protection against a loss of heat sink. A feed line break, inside or outside of containment, or a loss of MFW, would result in a loss of SG water level. SG Water Level-Low Low provides input to the SG Level Control System. Therefore, the actuation logic must be able to withstand both an input failure to the control system which may then require a protection function actuation and a single failure in the other channels providing the protection function actuation. Thus, four OPERABLE channels are required to satisfy the requirements with two-out-of-four logic. The setpoints are based on percent of narrow range instrument span.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

SG Water Level - Low Low in any operating SG will cause the motor driven AFW pumps to start. The system is aligned so that upon a start of the pump, water immediately begins to flow to the SGs. SG Water Level - Low Low in any two operating SGs will cause the turbine driven pumps to start.

c. Auxiliary Feedwater-Safety Injection

An SI signal starts the motor driven AFW pumps. The AFW initiation functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating functions and requirements.

d. Auxiliary Feedwater-Station Blackout

A loss of power or degraded voltage to the service buses will be accompanied by a loss of reactor coolant pumping power and the subsequent need for some method of decay heat removal. The loss of power or degraded voltage is detected by a voltage drop on each essential service bus. Loss of power or degraded voltage to either essential service bus will start the turbine driven and motor driven AFW pumps to ensure that at least two SGs contain enough water to serve as the heat sink for reactor decay heat and sensible heat removal following the reactor trip. The turbine driven pump does not start on a loss of power coincident with a SI signal.

Functions 6.a through 6.d must be OPERABLE in MODES 1, 2, and 3 to ensure that the SGs remain the heat sink for the reactor. These Functions do not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink. In MODE 4, AFW actuation does not need to be OPERABLE because either AFW or residual heat removal (RHR) will already be in operation to remove decay heat or sufficient time is available to manually place either system in operation.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

e. Auxiliary Feedwater-Trip of All Main Feedwater Pumps

A Trip of all MFW pumps is an indication of a loss of MFW and the subsequent need for some method of decay heat and sensible heat removal to bring the reactor back to no load temperature and pressure. Two contacts are provided in series (one from each MFW pump) in the starting circuit for each AFW pump. A trip of all MFW pumps closes both contacts and starts the motor driven AFW pumps to ensure that at least two SGs are available with water to act as the heat sink for the reactor. This function must be OPERABLE in MODES 1 and 2. This ensures that at least two SGs are provided with water to serve as the heat sink to remove reactor decay heat and sensible heat in the event of an accident. In MODES 3, 4, and 5, the MFW pumps are normally shut down, and thus neither pump trip is indicative of a condition requiring automatic AFW initiation.

f. Auxiliary Feedwater-Pump Suction Transfer on Suction Pressure-Low

A low pressure signal in the AFW pump suction line protects the AFW pumps against a loss of the normal supply of water for the pumps, the condensate storage system. Two pressure switches per train are located on the AFW pump suction line from the condensate storage system. The turbine driven AFW pump has a total of four switches. A low pressure signal sensed by two-out-of-two switches on either train will cause the emergency supply of water for the pump to be aligned. The NSWS (safety grade) is then lined up to supply the AFW pumps to ensure an adequate supply of water for the AFW System to maintain at least two of the SGs as the heat sink for reactor decay heat and sensible heat removal.

This Function must be OPERABLE in MODES 1, 2, and 3 to ensure a safety grade supply of water for the AFW System to maintain the SGs as the heat sink for the reactor. This Function does not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink. In MODE 4, AFW automatic suction transfer does not need to be OPERABLE because RHR will already be in operation, or sufficient time is available to place RHR in operation, to remove decay heat.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

7. Automatic Switchover to Containment Sump

At the end of the injection phase of a LOCA, the RWST will be nearly empty. Continued cooling must be provided by the ECCS to remove decay heat. The source of water for the ECCS pumps is automatically switched to the containment recirculation sump. The low head residual heat removal (RHR) pumps and containment spray pumps draw the water from the containment recirculation sump, the RHR pumps pump the water through the RHR heat exchanger, inject the water back into the RCS, and supply the cooled water to the other ECCS pumps. Switchover from the RWST to the containment sump must occur before the RWST empties to prevent damage to the RHR pumps and a loss of core cooling capability.

a. Automatic Switchover to Containment Sump-Refueling Water Storage Tank (RWST) Level-Low Coincident With Safety Injection

During the injection phase of a LOCA, the RWST is the source of water for all ECCS pumps. A low level in the RWST coincident with an SI signal provides protection against a loss of water for the ECCS pumps and indicates the end of the injection phase of the LOCA. The RWST is equipped with three level transmitters. These transmitters provide no control functions. Therefore, a two-out-of-three logic is adequate to initiate the protection function actuation.

Automatic switchover occurs only if the RWST low level signal is coincident with SI. This prevents accidental switchover during normal operation. Accidental switchover could damage ECCS pumps if they are attempting to take suction from an empty sump. The automatic switchover Function requirements for the SI Functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating Functions and requirements. These Functions must be OPERABLE in MODES 1, 2, and 3 when there is a potential for a LOCA to occur, to ensure a continued supply of water for the ECCS pumps. These Functions are not required to be OPERABLE in MODES 4, 5, and 6 because

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

there is adequate time for the operator to evaluate unit conditions and respond by manually starting systems, pumps, and other equipment to mitigate the consequences of an abnormal condition or accident. System pressure and temperature are very low and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

8. Engineered Safety Feature Actuation System Interlocks

To allow some flexibility in unit operations, several interlocks are included as part of the ESFAS. These interlocks permit the operator to block some signals, automatically enable other signals, prevent some actions from occurring, and cause other actions to occur. The interlock Functions back up manual actions to ensure bypassable functions are in operation under the conditions assumed in the safety analyses.

a. Engineered Safety Feature Actuation System Interlocks-Reactor Trip, P-4

The P-4 interlock is enabled when a reactor trip breaker (RTB) and its associated bypass breaker is open. Operators are able to reset SI 60 seconds after initiation. If a P-4 is present when SI is reset, subsequent automatic SI initiation will be blocked until the RTBs have been manually closed. This Function allows operators to take manual control of SI systems after the initial phase of injection is complete while avoiding multiple SI initiations. The functions of the P-4 interlock are:

- Trip the main turbine;
- Isolate MFW with coincident low $T_{avg}$;
- Prevent reactuation of SI after a manual reset of SI; and
- Prevent opening of the MFW isolation valves if they were closed on SI or SG Water Level-High High.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Each of the above Functions is interlocked with P-4 to avert or reduce the continued cooldown of the RCS following a reactor trip. An excessive cooldown of the RCS following a reactor trip could cause an insertion of positive reactivity with a subsequent increase in generated power. To avoid such a situation, the noted Functions have been interlocked with P-4 as part of the design of the unit control and protection system.

None of the noted Functions serves a mitigation function in the unit licensing basis safety analyses. Only the turbine trip Function is explicitly assumed since it is an immediate consequence of the reactor trip Function. Neither turbine trip, nor any of the other three Functions associated with the reactor trip signal, is required to show that the unit licensing basis safety analysis acceptance criteria are not exceeded.

The RTB position switches that provide input to the P-4 interlock only function to energize or de-energize or open or close contacts. Therefore, this Function has no adjustable trip setpoint with which to associate a Trip Setpoint and Allowable Value.

This Function must be OPERABLE in MODES 1, 2, and 3 when the reactor may be critical or approaching criticality. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because the main turbine, the MFW System are not in operation.

b. Engineered Safety Feature Actuation System Interlocks-Pressurizer Pressure, P-11

The P-11 interlock permits a normal unit cooldown and depressurization without actuation of SI or main steam line isolation. With two-out-of-three pressurizer pressure channels (discussed previously) less than the P-11 setpoint, the operator can manually block the Pressurizer Pressure-Low SI signal and the Steam Line Pressure-Low steam line isolation signal (previously discussed).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

When the Steam Line Pressure-Low steam line isolation signal is manually blocked, a main steam isolation signal on Steam Line Pressure-Negative Rate-High is enabled. This provides protection for an SLB by closure of the MSIVs. With two-out-of-three pressurizer pressure channels above the P-11 setpoint, the Pressurizer Pressure-Low SI signal and the Steam Line Pressure-Low steam line isolation signal are automatically enabled. The operator can also enable these trips by use of the respective manual reset buttons. When the Steam Line Pressure-Low steam line isolation signal is enabled, the main steam isolation on Steam Line Pressure-Negative Rate-High is disabled.

This Function must be OPERABLE in MODES 1, 2, and 3 to allow an orderly cooldown and depressurization of the unit without the actuation of SI or main steam isolation. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because system pressure must already be below the P-11 setpoint for the requirements of the heatup and cooldown curves to be met.

c. Engineered Safety Feature Actuation System Interlocks-$T_{avg}$-Low Low, P-12

On increasing reactor coolant temperature, the P-12 interlock provides an arming signal to the Steam Dump System. On a decreasing temperature, the P-12 interlock removes the arming signal to the Steam Dump System to prevent an excessive cooldown of the RCS due to a malfunctioning Steam Dump System.

Since $T_{avg}$ is used as an indication of bulk RCS temperature, this Function meets redundancy requirements with one OPERABLE channel in each loop. These channels are used in two-out-of-four logic.

This Function must be OPERABLE in MODES 1, 2, and 3 when a secondary side break or stuck open valve could result in the rapid depressurization of the steam lines. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because there is insufficient energy in the secondary side of the unit to have an accident.

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

BASES

ACTIONS (continued)

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.

BASES

ACTIONS (continued)

C.1, C.2.1 and C.2.2

Condition C applies to the automatic actuation logic and actuation relays for the following functions:

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

This action addresses the train orientation of the SSPS and the master and slave relays. If one train is inoperable, 6 hours are allowed to restore the train to OPERABLE status. The specified Completion Time is reasonable considering that there is another train OPERABLE, 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 (12 hours total time) and in MODE 5 within an additional 30 hours (42 hours total time). The 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.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing, provided the other train is OPERABLE. The Required Actions are not required to be met during this time, unless the train is discovered inoperable during the testing. This allowance is based on the reliability analysis assumption of WCAP-10271-P-A (Ref. 7) that 4 hours is the average time required to perform channel surveillance.

D.1, D.2.1, and D.2.2

Condition D applies to:

- Containment Pressure-High;
- Pressurizer Pressure-Low Low;
- Steam Line Pressure-Low;

BASES

ACTIONS (continued)

- Steam Line Pressure-Negative Rate-High;
- SG Water Level – High High (P-14) for the Feedwater Isolation Function.
- SG Water level-Low Low, and
- Loss of offsite power.

If one channel is inoperable, 6 hours are allowed to restore the channel to OPERABLE status or to place it in the tripped condition. Generally this Condition applies to functions that operate on two-out-of-three logic. Therefore, failure of one channel places the Function in a two-out-of-two configuration. One channel must be tripped to place the Function in a one-out-of-two configuration that satisfies redundancy requirements.

Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 6 hours requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours.

The allowed 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. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows the inoperable channel to be bypassed for up to 4 hours for surveillance testing of other channels. The note also allows an OPERABLE channel to be placed in bypass without entering the Required Actions for up to 4 hours for testing of the bypassed channel. However, only one channel may be placed in bypass at any one time. The 6 hours allowed to restore the channel to OPERABLE status or to place the inoperable channel in the tripped condition, and the 4 hours allowed for testing, are justified in Reference 7.

E.1, E.2.1, and E.2.2

Condition E applies to:

- Containment Spray Containment Pressure - High High;
- Containment Phase B Isolation Containment Pressure - High-High, and
- Steam Line Isolation Containment Pressure - High High.

BASES

ACTIONS (continued)

None of these signals has input to a control function. Thus, two-out-of-three logic is necessary to meet acceptable protective requirements. However, a two-out-of-three design would require tripping a failed channel. This is undesirable because a single failure would then cause spurious containment spray initiation. Spurious spray actuation is undesirable because of the cleanup problems presented. Therefore, these channels are designed with two-out-of-four logic so that a failed channel may be bypassed rather than tripped. Note that one channel may be bypassed and still satisfy the single failure criterion.

Furthermore, with one channel bypassed, a single instrumentation channel failure will not spuriously initiate containment spray.

To avoid the inadvertent actuation of containment spray and Phase B containment isolation, the inoperable channel should not be placed in the tripped condition. Instead it is bypassed. Restoring the channel to OPERABLE status, or placing the inoperable channel in the bypass condition within 6 hours, is sufficient to assure that the Function remains OPERABLE and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The Completion Time is further justified based on the low probability of an event occurring during this interval. Failure to restore the inoperable channel to OPERABLE status, or place it in the bypassed condition within 6 hours, requires the unit be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours. The allowed 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. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows one additional channel to be bypassed for up to 4 hours for surveillance testing. Placing a second channel in the bypass condition for up to 4 hours for testing purposes is acceptable based on the results of Reference 7.

F.1, F.2.1, and F.2.2

Condition F applies to:

- Manual Initiation of Steam Line Isolation; and
- P-4 Interlock.

BASES

ACTIONS (continued)

For the Manual Initiation and the P-4 Interlock Functions, this action addresses the train orientation of the SSPS. If a train or channel is inoperable, 48 hours is allowed to return it to OPERABLE status. The specified Completion Time is reasonable considering the nature of these Functions, the available redundancy, and the low probability of an event occurring during this interval. If the Function cannot be returned to OPERABLE status, the unit must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power in an orderly manner and without challenging unit systems. In MODE 4, the unit does not have any analyzed transients or conditions that require the explicit use of the protection functions noted above.

G.1 and G.2

Condition G applies to manual initiation of Steam Line Isolation.

This action addresses the operability of the manual steam line isolation function for each individual main steam isolation valve. If a channel is inoperable, 48 hours is allowed to return it to an OPERABLE status. If the train cannot be restored to OPERABLE status, the Conditions and Required Actions of LCO 3.7.2, "Main Steam Isolation Valves," must be entered for the associated inoperable valve. The specified Completion Time is reasonable considering that there is a system level manual initiation train for this Function and the low probability of an event occurring during this interval.

H.1, H.2.1 and H.2.2

Condition H applies to the automatic actuation logic and actuation relays for the Steam Line Isolation, Feedwater Isolation, and AFW actuation Functions.

The action addresses the train orientation of the SSPS and the master and slave relays for these functions. If one train is inoperable, 6 hours are allowed to restore the train to OPERABLE status. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. If the train cannot be returned to OPERABLE status, the unit must be brought to MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly

BASES

ACTIONS (continued)

manner and without challenging unit systems. Placing the unit in MODE 4 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. This allowance is based on the reliability analysis (Ref. 7) assumption that 4 hours is the average time required to perform channel surveillance.

I.1 and I.2

Condition I applies to the automatic actuation logic and actuation relays for the Turbine Trip Function.

This action addresses the train orientation of the SSPS and the master and slave relays for this Function. If one train is inoperable, 6 hours are allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the following 6 hours. The Completion Time for restoring a train to OPERABLE status is reasonable considering that there is another train OPERABLE, and the low probability of an event occurring during this interval. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. These Functions are no longer required in MODE 3. Placing the unit in MODE 3 removes all requirements for OPERABILITY of the protection channels and actuation functions. In this MODE, the unit does not have analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows one train to be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. This allowance is based on the reliability analysis (Ref. 7) assumption that 4 hours is the average time required to perform channel surveillance.

J.1 and J.2

Condition J applies to:

- SG Water Level-High High (P-14) for the Turbine Trip Function; and
- $T_{avg}$-Low.

BASES

ACTIONS (continued)

If one channel is inoperable, 6 hours are allowed to restore one channel to OPERABLE status or to place it in the tripped condition. If placed in the tripped condition, the Function is then in a partial trip condition where one-out-of-two logic will result in actuation. The 6 hour Completion Time is justified in Reference 7. Failure to restore the inoperable channel to OPERABLE status or place it in the tripped condition within 6 hours requires the unit to be placed in MODE 3 within the following 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows the inoperable channel to be bypassed for up to 4 hours for surveillance testing of other channels. The note also allows an OPERABLE channel to be placed in bypass without entering the Required Actions for up to 4 hours for testing of the bypassed channel. However, only one channel may be placed in bypass at any one time. The 6 hours allowed to place the inoperable channel in the tripped condition, and the 4 hours allowed for a channel to be in the bypassed condition for testing, are justified in Reference 7.

K.1 and K.2

Condition K applies to the AFW pump start on trip of all MFW pumps.

This action addresses the relay contact orientation for the auto start function of the AFW System on loss of all MFW pumps. The OPERABILITY of the AFW System must be assured by allowing automatic start of the AFW System pumps. If a channel is inoperable,
1 hour is allowed to place the channel in trip. If placed in the tripped condition, the function is then in a partial trip condition where a one-out-of-one logic will result in actuation. If the channel is not placed in trip within 1 hour, 6 hours are allowed to place the unit in MODE 3. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems. In MODE 3, the unit does not have any analyzed transients or conditions that require the explicit use of the protection function noted above.

L.1

Not used.

BASES

ACTIONS (continued)

M.1, M.2.1 and M.2.2

Not used.

N.1 and N.2

Condition N applies to the Auxiliary Feedwater Pumps Suction Transfer on Suction Pressure Low.

If one or more channels on a single AFW pump is inoperable, 48 hours is allowed to restore the channel(s) to OPERABLE status or to declare the associated AFW pump inoperable. The failure of one or more channels on one pump disables the ability for the suction transfer on that pump.

The allowed Completion Times are reasonable, considering the remaining redundant pumps and transfer instrumentation.

O.1

Condition O applies to the Auxiliary Feedwater Pumps Suction Transfer on Suction Pressure Low.

If one or more channels on more than one AFW pumps are inoperable, the ability for the suction transfer has been lost on multiple pumps. In this case, the associated AFW pumps must be declared inoperable immediately.

P.1 and P.2

Condition P applies to RWST Level-Low Coincident with Safety Injection.

RWST Level-Low Coincident with SI provides actuation of switchover to the containment sump. The inoperable channel shall be returned to OPERABLE status or placed in the trip condition within 1 hour. This Condition applies to a function that operates on two-out-or-three logic. Therefore, failure of one channel places the Function in a two-out-or-two configuration. The channel must be tripped to place the Function in a one-out-of-two configuration that satisfies redundancy requirements. A channel placed in the trip condition shall be restored to OPERABLE status within 48 hours. With one channel in the trip condition, a single failure of another channel coincident with a design basis Loss of Coolant Accident (LOCA) could result in premature automatic swapover of ECCS pumps to the containment recirculation sump. For a failure leading to early swapover, plant analyses assume operators do not have

BASES

ACTIONS (continued)

sufficient time to resolve the problem prior to ECCS pump damage. Consequently, as a result of this premature swapover, both trains of ECCS pumps could fail due to insufficient sump water level. This could prevent the ECCS pumps from performing their post-LOCA cooling function. The allowed Completion Time of 48 hours is reasonable since, based on operating experience, there is a very small probability of a random failure of another RWST level channel in a given 48 hour period.

Q.1, Q.2.1 and Q.2.2

Condition Q applies to the P-11 and P-12 interlocks.

With one channel inoperable, the operator must verify that the interlock is in the required state for the existing unit condition. The verification is performed by visual observation of the permissive status light in the unit control room. This action manually accomplishes the function of the interlock. Determination must be made within 1 hour. The 1 hour Completion Time is equal to the time allowed by LCO 3.0.3 to initiate shutdown actions in the event of a complete loss of ESFAS function. If the interlock is not in the required state (or placed in the required state) for the existing unit condition, the unit must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 hours. The allowed 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. Placing the unit in MODE 4 removes all requirements for OPERABILITY of these interlocks.

R.1

Condition R applies to the Containment Pressure Control System Start and Terminate Permissives.

With one or more channels inoperable, the affected containment spray, containment air return fans, and hydrogen skimmer fans must be declared inoperable immediately. The supported system LCOs provide the appropriate Required Actions and Completion Times for the equipment made inoperable by the inoperable channel. The immediate Completion Time is appropriate since the inoperable channel could prevent the supported equipment from starting when required. Additionally, protection from an inadvertent actuation may not be provided if the terminate function is not OPERABLE.

S.1 and S.2

Condition S applies to RWST Level-Low Coincident with Safety Injection.

BASES

ACTIONS (continued)

When Required Actions cannot be completed within their Completion Time, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and MODE 4 within 12 hours of entering the Condition. The allowed 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. In MODE 4, the unit does not have any analyzed transients of conditions that require the explicit use of the protection functions noted above.

SURVEILLANCE REQUIREMENTS

The SRs for each ESFAS Function are identified by the SRs column of Table 3.3.2-1.

A Note has been added to the SR Table to clarify that Table 3.3.2-1 determines which SRs apply to which ESFAS Functions.

Note that each channel of process protection supplies both trains of the ESFAS. When testing channel I, train A and train B must be examined. Similarly, train A and train B must be examined when testing channel II, channel III, and channel IV (if applicable). The CHANNEL CALIBRATION and COTs are performed in a manner that is consistent with the assumptions used in analytically calculating the required channel accuracies.

SR 3.3.2.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more

BASES

SURVEILLANCE REQUIREMENTS (continued)

frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.2.2

SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 31 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.2.3

SR 3.3.2.3 is the performance of a COT on the RWST level and Containment Pressure Control Start and Terminate Permissives.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found within the Allowable Values specified in Table 3.3. 2-1. This test is performed every 31 days. The Frequency is adequate, based on operating experience, considering instrument reliability and operating history data.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 31 days on a STAGGERED TEST BASIS. The time allowed for the testing (4 hours) and the surveillance interval are justified in Reference 7.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.5

SR 3.3.2.5 is the performance of a COT.

A COT is performed on each required channel to ensure the channel will perform the intended Function. The tested portion of the loop must trip within the Allowable Values specified in Table 3.3. 2-1.

The setpoint shall be left set consistent with the assumptions of the setpoint methodology.

The Frequency of 92 days is justified in Reference 7.

SR 3.3.2.6

SR 3.3.2.6 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation MODE is either allowed to function, or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation MODE is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 92 days. The Frequency is adequate, based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.2.7

SR 3.3.2.7 is the performance of a TADOT. This test is a check of the Manual Actuation Functions, AFW pump start, and Reactor Trip (P-4) Interlock. It is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.). The Frequency is adequate, based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation Functions. The manual initiation Functions have no associated setpoints.

SR 3.3.2.8

SR 3.3.2.8 is the performance of a CHANNEL CALIBRATION.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. The applicable time constants are shown in Table 3.3.2-1.

SR 3.3.2.9

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in the UFSAR (Ref. 2). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the Trip Setpoint value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate UFSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing

BASES

SURVEILLANCE REQUIREMENTS (continued)

vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be either demonstrated by test or their equivalency to those listed in WCAP-13632-P-A, Revision 2. Any demonstration of equivalency must have been determined to be acceptable by NRC staff review.

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel. Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

This SR is modified by a Note that clarifies that the turbine driven AFW pump is tested within 24 hours after reaching 900 psig in the SGs.

BASES

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 7.

3. UFSAR, Chapter 15.

4. IEEE-279-1971.

5. 10 CFR 50.49.

6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).

7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, May 1986 and June 1990.

8. WCAP 13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" Sep., 1995.

9. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" Oct., 1998.

**Attachment 3**

**Description of Proposed Changes and Technical Justification**

## McGuire Nuclear Station - Proposed Changes to TS 3.3.2, Engineered Safety Feature Actuation System and TS Table 3.3.2-1, Engineered Safety Feature Actuation System Instrumentation

### Background

The changes proposed in this license amendment request (LAR) apply to Technical Specification (TS) 3.3.2, Engineered Safety Feature Actuation System (ESFAS) and TS Table 3.3.2-1, Engineered Safety Feature Actuation System Instrumentation for McGuire Nuclear Station. The proposed changes are discussed below.

The purpose of the ESFAS is to initiate necessary safety systems based on the values of selected unit parameters, to protect against violating core design limits and the reactor coolant system pressure boundary, as well as to mitigate accidents. The proposed changes for the McGuire ESFAS TS are discussed in the following 7 items listed below. A description of the proposed change and a technical justification are provided for each of the items.

NOTE: As proposed below in Item 2, ESFAS Function 5 as it is now listed in Table 3.3.2-1, is being divided and displayed in a new alphanumerical order. Unless stated otherwise, when affected contents of Table 3.3.2-1, current-Function 5, are referenced within Attachment 3, the proposed new alphanumerical designation is used.

### Discussion

1. Conditions L and M are being changed to state "Not used." The current Function 5.e, Doghouse Water Level-High High, is the only use of Conditions L and M in Table 3.3.2-1 and this proposed change deletes this function as discussed in Item 6 below. The Bases discussions for these conditions are also being revised to state "Not used."

2. In Table 3.3.2-1, Function 5, Turbine Trip and Feedwater Isolation, is being divided into two listings in the table. The proposed listings will be 5.a, Turbine Trip; and 5.b, Feedwater Isolation. Function 5 now contains five items (current Items 5.a through 5.e). Function 5 is being divided because some of these items apply only to the

**Attachment 3**

**Description of Proposed Changes and Technical Justification**

Turbine Trip Function, some of the items apply only to the Feedwater Isolation Function, while some of the items apply to both the Turbine Trip and the Feedwater Isolation Functions. The McGuire TS have more items listed under Function 5 than does NUREG 1431, *Standard Technical Specifications, Westinghouse Plants*. These additional items are $T_{avg}$-Low and coincident with Reactor Trip, P-4 and Doghouse Water Level-High High. This proposed change clarifies the current TS requirements that apply to these two functions (the Turbine Trip and Feedwater Isolation Functions). This change makes it easier to clearly implement this TS during plant operations and testing. For McGuire, currently in Table 3.3.2-1, Function 5, Turbine Trip and Feedwater Isolation lists five items as:

a. Automatic Actuation Logic and Actuation Relays
b. SG Water Level- High High (P-14)
c. Safety Injection
d. $T_{avg}$-Low and coincident with Reactor Trip, P-4
e. Doghouse Water Level-High High

As proposed in this LAR, current Function 5, Turbine Trip and Feedwater Isolation, would be displayed for McGuire as:

5.a. Turbine Trip
(1) Automatic Actuation Logic and Actuation Relays
(2) SG Water Level- High High (P-14)
(3) Safety Injection

5.b. Feedwater Isolation
(1) Automatic Actuation Logic and Actuation Relays
(2) SG Water Level- High High (P-14)
(3) Safety Injection
(4) $T_{avg}$-Low and coincident with Reactor Trip, P-4

Note current Functions 5.e, Doghouse Water Level-High High, is being deleted altogether, as discussed below in Item 6, and current Footnote (e) is not applicable to the Turbine Trip Function since this footnote addresses the valves associated with the isolation of feedwater. The applicable Bases are also revised to be consistent with the proposed new listing order of Table 3.3.2-1. Additional changes are also being proposed within Table 3.3.2-1, current-Function 5, and these are discussed subsequently in Attachment 3.

**Attachment 3**

**Description of Proposed Changes and Technical Justification**

The discussions for these additional changes to current-Function 5 are contained in Items 3 through 6 that follow. Note, these discussions use the proposed new listing order as it applies to the applicable item.

3. In Table 3.3.2-1, for Function 5.b.(1), Feedwater Isolation, Automatic Actuation Logic and Actuation Relays: A new MODE 3 operability requirement with current Footnote (e) is being added. The justification for the new MODE 3 operability requirement is provided following Item 4. The applicable Condition is being changed from I to H since the Required Action for an inoperable train specified in Condition H has an end state of MODE 4. Since a MODE 3 operability requirement is being added to this function, it follows that the correct end state is MODE 4.

4. In Table 3.3.2-1, for Function 5.b.(2), Feedwater Isolation, SG Water Level-High High (P-14): A new MODE 3 operability requirement with Footnote (e) is being added. The justification for the new MODE 3 operability requirement is provided in the following paragraphs. The applicable Condition is being changed from J to D since the Required Action for an inoperable channel specified in Condition D has an end state of MODE 4. Since a MODE 3 operability requirement is being added to this function, it follows that the correct end state is MODE 4.

The P-14 interlock provides feedwater isolation when the hi-hi Steam Generator (SG) level setpoint is reached. The former McGuire TS had separate listings in Table 3.3-3 for Turbine Trip and Feedwater Isolation, and the P-14 interlock. Turbine Trip and Feedwater Isolation on Hi-Hi SG Level were required operable in MODES 1 and 2. The P-14 interlock, however, was required operable in MODES 1, 2, and 3. During the conversion to the McGuire Improved Technical Specifications (ITS), the requirement to have P-14 operable in MODE 3 was inadvertently deleted. The purpose of this proposed change is to reinstate the requirement for P-14 to be operable in MODE 3 at McGuire. The ITS reference document, NUREG 1431, *Standard Technical Specifications, Westinghouse Plants*, has a bracketed MODE 3 requirement in regard to P-14. The bracket indicates that the requirement was to be included in the ITS conversion process depending on whether the former Technical Specifications contained the requirement. During the ITS conversion, the P-14 entry for the ESFAS Interlock Function was deleted under an

administrative change, with the justification being that it was captured under the Turbine Trip and Feedwater Isolation Functions. Consequently, the MODE 3 requirement was inadvertently dropped and this was not specifically called out in the Duke ITS submittal. This situation was initially identified by the Problem Investigation Process (PIP) at Catawba Nuclear Station. A PIP was initiated to evaluate this situation at both Catawba and McGuire. PIP is Duke's formal corrective action process for evaluating identified problems that may have operability concerns. No operability concerns were identified since Operations currently maintains P-14 operable in MODE 3 by procedure. Duke has determined that there should be a MODE 3 operability requirement in the TS for the P-14 function, since the feedwater system could now be placed in service with full automatic control in MODE 3. This could lead to a potential for a SG overfill to occur in MODE 3. Following implementation of this proposed change, MODE 4 will be the correct end state for this situation. Since the Automatic Actuation Logic and Actuation Relays are required for P-14 to be operable, the same change is also being made to Function 5.b.(1). Therefore, this proposed change applies to Functions 5.b.(1) and 5.b.(2).

5. In Table 3.3.2-1, for Function 5.a.(3), Turbine Trip, Safety Injection, the statement, "See Item 5.a.(1) for Applicable Modes," is being added. In Table 3.3.2-1, for Function 5.b.(3), Feedwater Isolation, Safety Injection, the statement, "See Item 5.b.(1) for Applicable Modes," is being added. Currently these functions reference only Function 1 (Safety Injection) for all initiation functions and requirements. This proposed addition clarifies the applicable MODES for Items 5.a.(3) and 5.b.(3), Safety Injection, as applicable to the Turbine Trip and Feedwater Isolation Functions.

6. In Table 3.3.2-1 current Function 5.e, Turbine Trip and Feedwater Isolation, Doghouse Water Level-High High, is being deleted. The doghouse water level instrumentation provides flooding protection for the doghouses and is not an ESFAS function and, as explained in the subsequent paragraphs, neither does it meet the regulatory criteria for inclusion in the TS.

   Duke Energy Corporation submitted its application to convert the McGuire TS to the ITS on May 27, 1997. Volume 1 of the

application contains what is commonly called the "Split Report." The Split Report applied the 10 CFR 50.36 selection criteria to the McGuire TS. Page 3 of 10 of the Summary Disposition Matrix addressed the EFSAS (old TS 3/4.3.2). The ESFAS was retained in the ITS under Criterion 3 of the regulation. However, the application of the criteria of 10 CFR 50.36 was made at the overall LCO level (i.e., to the ESFAS as a whole), and not to individual ESFAS functions. Thus, the Doghouse Function remained in the McGuire ITS even though it is not deemed to meet the 10 CFR 50.36 criteria for inclusion in the TS. This approach was consistent with the approach used by other utilities in their TS conversion efforts.

If a structure, system, or component (SSC) is deemed to meet any of the 10 CFR 50.36 criteria, then that SSC should be included in the plant TS. The four criteria are as follows:

> Criterion 1 - Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.
>
> Criterion 2 - A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
>
> Criterion 3 - A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
>
> Criterion 4 - A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The Turbine Trip and Feedwater Isolation - Doghouse Water Level - High High Function (current Function 5e) terminates forward feedwater flow in the event of a postulated pipe break in the main feedwater piping in the doghouses to prevent flooding safety related equipment essential to the

safe shutdown of the plant. With respect to the 10 CFR 50.36 criteria, this function: 1) is not used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary (i.e., it is not a reactor coolant leakage detection feature); 2) is not a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of, or presents a challenge to, the integrity of a fission product barrier (i.e., it is not an accident or transient analysis assumption); 3) is not a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier (i.e., it is not a credited function of any design basis accident or transient analysis); and 4) is not a structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety (i.e., it is not significant enough to be credited or modeled in the McGuire Probabilistic Risk Assessment and is not significant from an operating experience point of view). Based on the low frequency of initiating events for which this function would be demanded and the limited consequences of a failure of the function, this function is evaluated to have a low potential for risk significance and has been screened from inclusion in the McGuire PRA analysis. It is therefore not a risk-significant plant feature.

The Doghouse Function accomplishes a flood protection feature in the event of a main feedwater line break in the doghouses. Flood protection features do not meet the threshold for inclusion in the TS. In Chapter 7.3 of the McGuire Updated Final Safety Analysis Report (UFSAR), the ESFAS instrumentation is discussed. This particular function is not listed, nor discussed, as an ESFAS function in Chapter 7.3 of the UFSAR.

The deletion of the Doghouse Function from the TS is consistent with NUREG-1431, *Improved Standard Technical Specifications, Westinghouse Plants*, since this function is not included in NUREG-1431. The justification for its deletion is similar to that contained in the McGuire ITS conversion submittal for the deletion of other functions which were not credited or required by the McGuire safety

analyses (e.g., Auxiliary Feedwater - Manual Initiation). In this submittal, Duke is proposing to relocate the Turbine Trip and Feedwater Isolation, Doghouse Water Level-High High Function to the Selected Licensee Commitments (SLC) Manual. The SLC Manual is Chapter 16 of the McGuire UFSAR. Changes to the SLC Manual are controlled by the 10 CFR 50.59 process.

Based on the considerations discussed above, this function has been determined to not meet the 10 CFR 50.36 criteria for inclusion in plant TS. Therefore, this function is being proposed for deletion from the McGuire TS and relocation to the McGuire SLC Manual, such that appropriate administrative controls (consistent with 10 CFR 50.59) will continue to be maintained for it in the future. Necessary changes will be made to Chapter 16 of the McGuire UFSAR. Also, the instrumentation and controls testing description contained in McGuire UFSAR Chapter 7.6.19.3.9 will be revised as necessary to reflect this deletion. These UFSAR changes will be made in accordance with the applicable regulation[1] and corresponding commitments for these future changes to the UFSAR are stated in the cover letter for this LAR submittal package. Conforming changes are also being made to the TS Bases to reflect the deletion of this function, consistent with the changes to the TS themselves.

7. In Table 3.3.2-1, for Function 6.e, Auxiliary Feedwater, Trip of all Main Feedwater Pumps: Footnote (a), as it applies to the MODE 2 applicability requirement, is being deleted. Footnote (a) states, "Above the P-11 (Presurizer Pressure) Interlock." This change is being made to correct an error since the plant cannot be operated below P-11 in MODE 2; consequently, the footnote has no meaning for the Trip of all Main Feedwater Pumps Function. Administrative adjustments to the listing of the applicable footnotes on each affected page are also being made as necessary.

Changes to the Bases for TS 3.3.2 are also necessary to: 1) ensure consistency with the proposed TS changes described above; 2) change the minimum number of steam generators supplied by the Auxiliary Feedwater System for ESFAS Functions 6.d, 6.e, and 6.f; and 3) make other administrative and editorial clarifications as necessary. Note that the second of these Bases changes is a previously identified McGuire Bases change being

[1] 10 CFR 50.71(e), "Maintenance of records, making of reports."

processed at this time that is unrelated to the other changes contained in this LAR. Note also that unrelated typographical errors are being corrected on Bases Page B3.3.2-39. Incorrect references to Table 3.3.1-1 are being changed to the correct Table 3.3.2-1 and a missing section title header is being added. The necessary revisions to the Bases have been made and are also included in this LAR submittal package as shown in Attachments 1 and 2.

## Precedent Licensing Actions

The TS changes proposed in this LAR for McGuire are consistent with those previously proposed, as supplemented, for Catawba Nuclear Station.[2,3,4] In a telephone conference call held between NRC officials and Duke representatives on October 24, 2002, an NRC request for additional information (RAI) on the December 20, 2001 Catawba LAR[2] was discussed. The current McGuire LAR is consistent with these discussions and the Duke response to the NRC RAI.

## Conclusion

This LAR proposes a change to address a non-conservative situation that exists with McGuire TS 3.3.2 for the mode operability requirements of the P-14 function. The changes proposed in this LAR add a MODE 3 requirement for P-14 and the Automatic Actuation Logic and Actuation Relays under the Feedwater Isolation Function. Additional changes are proposed that clarify several existing requirements of the ESFAS instrumentation contained in TS Table 3.3.2, including the reformatting of a portion of this table to make it more useable.

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[2] M. S. Tuckman, Duke Energy Corporation, Letter to the NRC Dated December 20, 2001, SUBJECT: Catawba Nuclear Station Units 1 and 2 License Amendment Request for Catawba Technical Specification 3.3.2, Engineered Safety Feature Actuation System Instrumentation, and 3.3.5, Loss of Power Diesel Generator Start Instrumentation

[3] M. S. Tuckman, Duke Energy Corporation, Letter to the NRC Dated March 4, 2002, SUBJECT: Catawba Nuclear Station Units 1 and 2 Withdrawal of a Portion of a License Amendment Request Applicable to Technical Specification 3.3.2 and Technical Specification Table 3.3.2-1

[4] G. R. Peterson, Duke Energy Corporation, Letter to the NRC Dated September 12, 2002, SUBJECT: Catawba Nuclear Station Units 1 and 2 License Amendment Request for Catawba Technical Specification 3.3.2, Engineered Safety Feature Actuation System Instrumentation, and 3.3.5, Loss of Power Diesel Generator Start Instrumentation

These additional changes are also conservative in nature and consistent with current plant operating practices and the applicable licensing bases. Additionally, there are changes proposed that delete one ESFAS function. This proposed deletion has been found to be consistent with the applicable safety analyses and regulatory requirements. Therefore, based on the preceding considerations and the discussions detailed earlier in Attachment 3, it has been concluded that the changes proposed in this LAR are acceptable for implementation at McGuire. Since some of the changes proposed in this LAR address a current non-conservative situation in the McGuire TS, Duke is requesting timely NRC review and approval of this submittal.

**Attachment 4**

**No Significant Hazards Consideration Determination**

The following discussion is a summary of the evaluation of the changes contained in this proposed license amendment against the three required standards of 10 CFR 50.92(c). A no significant hazards consideration is indicated if operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated, or

2. Create the possibility of a new or different kind of accident from any accident previously evaluated, or

3. Involve a significant reduction in a margin of safety.

First Standard

Implementation of this amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated. Implementation of the changes contained in this amendment will have no effect on accident probabilities or consequences. The proposed changes apply to Technical Specifications 3.3.2, Engineered Safety Features Actuation System, and the equipment referenced in this Technical Specification are not accident initiating equipment. Therefore, there will be no impact on any accident probabilities caused by the NRC approval of this license amendment request. Additionally, since the design of the equipment is not being adversely modified by these proposed changes, there will be no impact on any accident consequences.

**Attachment 4**

**No Significant Hazards Consideration Determination**

Second Standard

Implementation of this amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated. No new accident causal mechanisms will be created as a result of the NRC approval of this license amendment request. No changes are being made to the plant which will introduce any new accident causal mechanisms. This amendment does not impact any plant systems that are accident initiators; therefore, no new accident types are being created.

Third Standard

Implementation of this amendment would not involve a significant reduction in a margin of safety. Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. These barriers include the fuel cladding, the reactor coolant system, and the containment system. The performance of these fission product barriers will not be impacted by implementation of this amendment. The equipment referenced in the proposed change to Technical Specification 3.3.2 will remain capable of performing as designed. No safety margins will be impacted.

Conclusion

Based upon the preceding discussion, Duke Energy Corporation has concluded that this proposed license amendment does not involve a significant hazards consideration.

## Attachment 5

## Environmental Assessment/Impact Statement

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