# FINAL SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER

# TSTF-592, REVISION 2

# "REVISE AUTOMATIC DEPRESSURIZATION SYSTEM (ADS)

# INSTRUMENTATION REQUIREMENTS"

# USING THE CONSOLIDATED LINE ITEM IMPROVEMENT PROCESS

# (EPID: L-2022-PMP-0011)

## 1.0 INTRODUCTION

By letter dated September 13, 2023, as supplemented by letter dated October 10, 2023, (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML23256A352 and ML23283A002, respectively), the Technical Specifications Task Force (TSTF) submitted Traveler TSTF-592, Revision 2, "Revise Automatic Depressurization System (ADS) Instrumentation Requirements" (TSTF-592), to the U.S. Nuclear Regulatory Commission (NRC). TSTF-592 proposed changes to the Standard Technical Specifications (STS) for boiling-water reactor (BWR) designs under the consolidated line item improvement process (CLIIP). Upon approval, these changes would be incorporated into future revisions of NUREG-1433 and NUREG-1434, and this traveler would be available to licensees for adoption through the CLIIP.[1]

The proposed change would revise "Emergency Core Cooling System (ECCS) Instrumentation," technical specifications (TS) Actions related to ADS instrumentation monitoring channels.

## 2.0 REGULATORY EVALUATION

### 2.1 System Description

The purpose of the ECCS instrumentation is to initiate appropriate responses from systems to ensure that the fuel is adequately cooled in the event of a design basis accident or transient. The ECCS uses two independent methods (flooding and spraying) to cool the core during a loss-of-coolant accident (LOCA).

According to the BWR/4 STS Bases, the BWR/4 systems that ECCS instrumentation actuates are core spray (CS), low-pressure coolant injection (LPCI), high-pressure coolant injection (HPCI), ADS, and the diesel generators. According to the BWR/6 STS Bases, the BWR/6

[1] U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Volume 1, "Specifications," and Volume 2, "Bases," Revision 5.0, September 2021 (ML21272A357 and ML21272A358, respectively).

U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/6 Plants," NUREG-1434, Volume 1, "Specifications," and Volume 2, "Bases," Revision 5.0, September 2021 (ML21271A582 and ML21271A596, respectively).

systems that the ECCS instrumentation actuates are low-pressure core spray (LPCS), LPCI, high pressure core spray (HPCS), ADS, and the diesel generators.

The low-pressure ECCS subsystems are designed to mitigate a large break LOCA where reactor vessel pressure rapidly decreases to the point at which the low-pressure ECCS pumps can inject water. There are two redundant divisions for each of the low-pressure ECCS subsystems. For example, BWR/4 plants typically have two LPCI subsystems and two CS subsystems. BWR/6 plants typically have one LPCS subsystem and three LPCI subsystems.

The high-pressure ECCS subsystem is designed to mitigate small break LOCAs during which reactor vessel pressure remains higher than the ability of the low-pressure ECCS pumps to inject water. There is a single high-pressure ECCS subsystem. For example, BWR/4 plants have HPCI, and BWR/6 plants have HPCS.

The ADS provides redundancy for the single high-pressure ECCS subsystem. In the event of a failure of the high-pressure ECCS subsystem, the ADS valves open to release reactor vessel pressure to the suppression pool, rapidly reducing the pressure to the point at which a low-pressure ECCS subsystem can inject water.

There are two ADS trip systems, designated in the STS as ADS Trip Systems A and B. Either trip system can open all the ADS valves if drywell pressure (or a drywell pressure bypass timer signal is present) and reactor vessel water level conditions are satisfied, the ADS initiation timer has completed, and one low-pressure ECCS pump associated with the trip system is operating as indicated by pump discharge pressure. Each of these conditions (e.g., pressure, level, and timers) are described in more detail below.

- High pressure in the drywell could indicate a break in the reactor coolant pressure boundary. Therefore, ADS receives one of the signals necessary for initiation from this Function to minimize the possibility of fuel damage. However, if the event requiring ADS initiation occurs outside the drywell (e.g., main steam line break outside containment), a high drywell pressure signal may never be present. Therefore, in a typical BWR/4 plant the Automatic Depressurization System Low Water Level Actuation Timer is used to bypass the Drywell Pressure - High Function after a certain time period has elapsed. The typical BWR/6 design has the same drywell pressure bypass function, but it is referred to as the ADS Bypass Timer (High Drywell Pressure).

- Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, ADS receives one of the signals (Level 1) necessary for initiation from this Function. To prevent spurious initiation of the ADS due to spurious Level 1 signals, a confirmatory low RPV water level signal (Level 3) must also be received before ADS initiates.

- The ADS initiation timer delays depressurization of the reactor vessel to allow the HPCI (BWR/4) or HPCS (BWR/6) system time to maintain reactor vessel water level. Since the rapid depressurization caused by ADS operation is one of the most severe transients on the reactor vessel, its occurrence should be limited. By delaying initiation of the ADS Function, the operator is given the chance to monitor the success or failure of the HPCI or HPCS system to maintain water level, and then to decide whether to allow ADS to initiate, to delay initiation further by recycling the timer, or to inhibit initiation permanently.

- High pump discharge pressure signals from the low-pressure ECCS pumps are used as permissives for ADS initiation, indicating that there is a source of low-pressure cooling water available once the ADS has depressurized the vessel. The ADS valves will not open unless at least one low-pressure ECCS pump is operating (i.e., both channels for the pump indicate a high discharge pressure condition) to provide a source of coolant once the reactor vessel has been depressurized. Any one of the six BWR/4 low pressure pumps or four BWR/6 low pressure pumps is sufficient to permit automatic depressurization.

2.2 Proposed Changes to Standard Technical Specification 3.3.5.1, "ECCS Instrumentation"

The following safety evaluation (SE) subsections describe the proposed changes to STS 3.3.5.1 for NUREG-1433 (BWR/4) and NUREG-1434 (BWR/6). Traveler TSTF-592 provided STS redline/strikeout mark-ups showing the changes described below.

2.2.1 Proposed Changes to NUREG-1433 STS 3.3.5.1, "ECCS Instrumentation"

- STS Table 3.3.5.1-1 is revised to reference Condition H instead of Condition G for Functions 4.e, 4.f, 4.h, 5.e, 5.f, and 5.h.

- STS 3.3.5.1, Required Action G.1, is revised to delete the Note.

- STS 3.3.5.1 is revised to add a new Condition H and associated remedial actions.

    - Condition H states, "As required by Required Action A.1 and referenced in Table 3.3.5.1-1."

    - Required Action H.1 states, "Declare ADS valves inoperable," and is modified by two Notes. The first Note limits the Required Action applicability to Functions 4.e, 4.f, 5.e, and 5.f. The second Note limits the Required Action applicability to when both ADS Trip Systems are inoperable due to Core Spray/LPCI Pump Discharge Pressure - High channels being inoperable. The Completion Time is "1 hour from discovery of loss of ADS initiation capability in both trip systems."

    - Required Action H.2 states, "Restore affected channels to OPERABLE status," and is modified by two Notes. The first Note limits the Required Action applicability to Functions 4.e, 4.f, 5.e, and 5.f. The second Note limits the Required Action applicability to when one ADS Trip System is inoperable due to Core Spray/LPCI Pump Discharge Pressure – High channels being inoperable. The Completion Time is 96 hours from discovery of inoperable channels concurrent with HPCI or RCIC [reactor core isolation cooling] inoperable, and 8 days from discovery of loss of inoperable channels. The option of including a Risk Informed Completion Time alternative is included.

    - Required Action H.3 states, "Restore channel to OPERABLE status," with a Completion Time of "30 days."

- STS 3.3.5.1 current Action H is renamed Action I, and is modified to include the new Condition H.

2.2.2 Proposed Changes to NUREG-1434 STS 3.3.5.1, “ECCS Instrumentation”

- STS Table 3.3.5.1-1 is revised to reference Condition H instead of Condition G for Functions 4.e, 4.f, 4.h, 5.e, and 5.g.

- STS 3.3.5.1, Required Action G.1, is revised to delete the Note.

- STS 3.3.5.1 is revised to add a new Condition H and associated remedial actions.

    - Condition H states, “As required by Required Action A.1 and referenced in Table 3.3.5.1-1.”

    - Required Action H.1 states, “Declare ADS valves inoperable,” and is modified by two Notes. The first Note limits the Required Action applicability to Functions 4.e, 4.f, and 5.e. The second Note limits the Required Action applicability to when both ADS trip systems are inoperable due to LPCS/LPCI Pump Discharge Pressure - High channels being inoperable. The Completion Time is “1 hour from discovery of loss of ADS initiation capability in both trip systems.”

    - Required Action H.2 states, “Restore affected channels to OPERABLE status,” and it is modified by two Notes. The first Note limits the Required Actions applicability to Functions 4.e, 4.f, and 5.e. The second Note limits the Required Actions applicability to when one ADS trip system is inoperable due to LPCS/LPCI Pump Discharge Pressure – High channels being inoperable. The Completion Time is 96 hours from discovery of inoperable channels concurrent with HPCS or RCIC inoperable, and 8 days from discovery of inoperable channels. The option of including a Risk Informed Completion Time alternative is included.

    - Required Action H.3 states, “Restore channel to OPERABLE status,” with a Completion Time of “30 days.”

- STS 3.3.5.1 current Action H is renamed Action I, and is modified to include the new Condition H.

2.2.3 Proposed Changes to the Presentation of Risk Informed Completion Times.

The presentation of Risk Informed Completion Times (RICT) applicable to Completion Times that state “from discovery” is revised as follows to provide consistency and clarity, without changing the intent of the TS.

NUREG-1433 TS 3.3.5.1, Required Action F.2 Completion Time currently states (in part):

- 96 hours from discovery of inoperable channel concurrent with HPCI or reactor core isolation cooling (RCIC) inoperable

  [OR

  In accordance with the Risk Informed Completion Time Program]

The Completion Time is revised to state:

- 96 hours [or in accordance with the Risk Informed Completion Time Program] from discovery of inoperable channel concurrent with HPCI or reactor core isolation cooling (RCIC) inoperable.

NUREG-1433 TS 3.3.5.1, Required Action G.2 Completion Time currently states (in part):

- 96 hours from discovery of inoperable channel concurrent with HPCI or RCIC inoperable

  [OR

  In accordance with the Risk Informed Completion Time Program]

The Completion Time is revised to state:

- 96 hours [or in accordance with the Risk Informed Completion Time Program] from discovery of inoperable channel concurrent with HPCI or RCIC inoperable.

NUREG-1434 TS 3.8.1, Required Action A.3 Completion Time currently states (in part):

- 24 hours from discovery of two divisions with no offsite power

  [OR

  In accordance with the Risk Informed Completion Time Program]

The Completion Time is revised to state:

- 24 hours [or in accordance with the Risk Informed Completion Time Program] from discovery of two divisions with no offsite power

2.3 Applicable Regulatory Requirements and Guidance

As described in the Commission's "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 FR 39132, dated July 22, 1993), the NRC and industry task groups for new STS recommended that improvements include greater emphasis on human factors principles in order to add clarity and understanding to the text of the STS, and provide improvements to the Bases of the STS, which provide the purpose for each requirement in the STS. The improved vendor-specific STS were developed and issued by the NRC in September 1992.

Section IV, "The Commission Policy," of the Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors states, in part:

> The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety by identifying those features that are of controlling importance to

> safety and establishing on them certain conditions of operation which cannot be changed without prior Commission approval.
>
> …[T]he Commission will also entertain requests to adopt portions of the improved STS [(e.g., TSTF-592)], even if the licensee does not adopt all STS improvements. …The Commission encourages all licensees who submit Technical Specification related submittals based on this Policy Statement to emphasize human factors principles.
>
> …In accordance with this Policy Statement, improved STS have been developed and will be maintained for each NSSS [nuclear steam supply system] owners group. The Commission encourages licensees to use the improved STS as the basis for plant-specific Technical Specifications. …[I]t is the Commission intent that the wording and Bases of the improved STS be used … to the extent practicable.

The Summary section of the Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors states, in part:

> Implementation of the Policy Statement through implementation of the improved STS is expected to produce an improvement in the safety of nuclear power plants through the use of more operator-oriented Technical Specifications, improved Technical Specification Bases, reduced action statement induced plant transients, and more efficient use of NRC and industry resources.

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.36(a)(1) require that:

> Each applicant for a license authorizing operation of a … utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications.

The regulations in 10 CFR 50.36(b) require that:

> Each license authorizing operation of a … utilization facility … will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 [“Contents of applications; technical information”]. The Commission may include such additional technical specifications as the Commission finds appropriate.

The categories of items required to be in the TS are listed in 10 CFR 50.36(c). The regulation at 10 CFR 50.36(c)(2) requires that TS include limiting conditions for operations (LCOs). Per

10 CFR 50.36(c)(2)(i), LCOs “are the lowest functional capability or performance levels of equipment required for safe operation of the facility.” The regulation also requires that when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met.

The NRC staff’s guidance for the review of TS is in NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition” (SRP), Chapter 16.0, “Technical Specifications,” Revision 3, dated March 2010 (ML100351425). As described therein, as part of the regulatory standardization effort, the NRC staff has prepared STS for each of the LWR nuclear designs. Accordingly, the NRC staff’s review includes consideration of whether the proposed changes are consistent with the applicable referenced STS, as modified by NRC-approved travelers. In addition, the SRP states that comparing the change to previous STS can help clarify the STS intent.

## 3.0 TECHNICAL EVALUATION

The NRC staff reviewed Traveler TSTF-592, Revision 2, which proposed changes to NUREG-1433 and NUREG-1434. The regulatory framework the NRC staff used to determine the acceptability of the proposed changes consists of the requirements and guidance listed in section 2.3 of this SE. The NRC staff reviewed the proposed changes to determine whether the proposed changes to the STS meet the standards for TS in 10 CFR 50.36(c)(2)(i), as well as conform to the “Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors”.

The OPERABILITY of the ECCS instrumentation is dependent upon the OPERABILITY of the individual instrumentation Functions specified in STS Table 3.3.5.1-1. Each Function must have a required number of OPERABLE channels. When a channel is discovered inoperable, in applicable modes or other specified conditions, STS 3.3.5.1 Condition A is entered for that channel and provides for transfer to the appropriate subsequent Condition by Required Action A.1. Required Action A.1 directs entry into the appropriate Condition referenced in Table 3.3.5.1-1. The applicable Condition referenced in Table 3.3.5.1-1 is Function dependent.

NUREG-1433 Table 3.3.5.1-1 currently references Condition G for ECCS Instrumentation Functions 4.c, 4.e, 4.f, 4.g, 4.h, 5.c, 5.e, 5.f, 5.g, and 5.h. NUREG-1434 Table 3.3.5.1-1 currently references Condition G for ECCS Instrumentation Functions 4.c, 4.e, 4.f, 4.g, 4.h, 5.c, 5.e, 5.f, and 5.g. Inoperability of a single ECCS instrumentation channel associated with the Functions identified above ultimately, if not restored after a maximum of 8 days, results in entry into Condition H, the immediate declaration of the ADS valves as inoperable, and a plant shutdown.

As an example, inoperability of a single pump pressure channel (NUREG-1433 Table 3.3.5.1-1 Function 4.e, 4.f, 5.e, or 5.f or NUREG-1434 Table 3.3.5.1-1 Function 4.e, 4.f, or 5.e), if not restored in 8 days, would result in declaring ADS valves inoperable, leading to a plant shutdown. However, due to redundancy in pump pressure channels, the loss of a single pump pressure channel does not result in a loss of ADS initiation capability. Similarly, the loss of a single manual initiation channel (e.g., NUREG-1433 Table 3.3.5.1-1 Function 4.h or 5.h, or NUREG-1434 Table 3.3.5.1-1 Function 4.h or 5.g), if not restored within 8 days would result in a plant shutdown. However, the manual initiation function does not impact automatic initiation capability and is not assumed in any accident or transient analysis.

Traveler TSTF-592 proposed to revise the ADS instrumentation remedial action requirements contained in the ECCS instrumentation specification, STS 3.3.5.1, to correct overly restrictive action requirements, and to treat less significant channel inoperabilities consistently.

3.1 Evaluation of Changes to STS Table 3.3.5.1-1

NUREG-1433 Table 3.3.5.1-1 Functions 4.c, 4.e, 4.f, 4.g, 4.h, 5.c, 5.e, 5.f, 5.g, and 5.h, and NUREG-1434 Table 3.3.5.1-1 Functions 4.c, 4.e, 4.f, 4.g, 4.h, 5.c, 5.e, 5.f, and 5.g currently reference Condition G.

Traveler TSTF-592 proposed to revise STS Table 3.3.5.1-1 to reference new Condition H instead of the current Condition G for ADS Trip System Functions associated with low pressure pumps and manual initiation. Timer Functions (NUREG-1433 Function 4.c, 4.g, 5.c, and 5.g; and NUREG-1434 Function 4.c, 4.g, 5.c, and 5.f) remain referenced to Condition G.

The proposed change to STS Table 3.3.5.1-1 is acceptable because it is a conforming change necessary to implement the new Action H remedial actions proposed by Traveler TSTF-592. The acceptability of new Action H remedial actions is evaluated in section 3.3 of this SE.

3.2 Evaluation of Changes to STS 3.3.5.1 Required Action G.1

NUREG-1433 STS 3.3.5.1 Required Action G.1 currently contains a Note that states, “Only applicable to Functions 4.c, 4.e, 4.f, 4.g, 5.c, 5.e, 5.f, and 5.g.” NUREG-1434 STS 3.3.5.1 Required Action G.1 currently contains a Note that states, “Only applicable to Functions 4.c, 4.e, 4.f, 4.g, 5.c, 5.e, and 5.f.”

Traveler TSTF-592 proposed to revise Required Action G.1 to delete the Note because the Note is no longer necessary given the changes to STS Table 3.3.5.1-1 discussed in section 3.1 of this SE, wherein STS Table 3.3.5.1-1 is revised such that Condition G is only referenced from ADS Trip System Functions associated with timers (NUREG-1433 Function 4.c, 4.g, 5.c, and 5.g; and NUREG-1434 Function 4.c, 4.g, 5.c, and 5.f).

The proposed change to STS 3.3.5.1 Required Action G.1 is acceptable because it is a conforming change necessary to implement the new Action H remedial actions proposed by Traveler TSTF-592. The acceptability of new Action H remedial actions is evaluated in section 3.3 of this SE.

3.3 Evaluation of New Action H to STS 3.3.5.1

NUREG-1433 STS 3.3.5.1, proposed new Condition H, is referenced to Functions 4.e, 4.f, 4.h, 5.e, 5.f, and 5.h. Similarly, NUREG-1434 STS 3.3.5.1, proposed new Condition H, is referenced to Functions 4.e, 4.f, 4.h, 5.e, and 5.g. As described in section 3.1 of this SE, these Functions were previously referenced to existing Condition G. These Functions are associated with instrumentation channels for pump pressure and manual initiation. Each of these Functions are described in more detail below.

The Traveler TSTF-592 justification for shifting these Functions from current Condition G to proposed new Condition H was to develop more appropriate remedial actions that account for the redundancy and diversity of these channels, and whether the Function is assumed in the accident analysis.

The NRC staff SE assessed if the proposed remedial actions ensured that appropriate actions were taken for inoperable channels that 1) result in a loss of automatic initiation capability in both ADS trip systems, 2) result in a loss of automatic initiation capability for one ADS trip system, or 3) result in no loss of automatic initiation capability in either trip system but require restoration per STS Table 3.3.5.1-1 to ensure overall redundancy and diversity of the ADS trip system functions.

Pump Pressure Channels

For the ADS trip system design assumed in the STS, the ADS trip system logic will not permit the ADS valves to open unless at least one low-pressure ECCS pump is operating to provide a source of coolant to the reactor vessel once the reactor vessel has been depressurized. There are six low-pressure ECCS pumps in BWR/4 plants and four low-pressure pumps in BWR/6 plants. One operating low-pressure ECCS pump is sufficient to permit automatic depressurization. To determine if a pump is operating, two channels of discharge pressure monitoring instrumentation are associated with each low-pressure ECCS pump. Both of a pump's associated channels must actuate to satisfy the ADS trip system logic that indicates pump operation.

The BWR/4 CS Pump A and LPCI Pumps A and D, and the BWR/6 LPCS Pump and LPCI Pump A channels input to the ADS Trip System A logic. The BWR/4 CS Pump B and LPCI Pumps B and C, and the BWR/6 LPCI Pumps B and C channels input to the ADS Trip System B logic. Only a single low-pressure ECCS pump with two operable channels is required for the associated ADS trip system to respond to design basis events. A single inoperable pump discharge pressure channel cannot render the ADS initiation capability inoperable.

Traveler TSTF-592 identified that there are some BWR/4 plants with an ADS initiation design that varies from the design assumed in the STS. The effect of these variations and applicability of the traveler will need to be evaluated on a plant-specific basis.

As described in Traveler TSTF-592, current Required Action G.2 applies when any low-pressure ECCS Pump Discharge Pressure – High channel is inoperable in either ADS trip system. The Completion Time is based on discovery of loss of ADS initiation capability for one trip system. There is not a loss of ADS initiation capability if there are at least two Pump Discharge Pressure – High channels for one low-pressure ECCS pump operable in either ADS trip system. Therefore, the current remedial actions for one inoperable channel are considered overly restrictive. The new proposed remedial actions for inoperable pump pressure channels are addressed in sections 3.3.2 through 3.3.4 of this SE.

Manual Initiation

According to the STS Bases, the ADS manual initiation Function is redundant to the automatic protective instrumentation Functions. The manual initiation Function is not assumed in any accident or transient analyses in the FSAR.

Currently, Required Action G.2 applies when any manual initiation channel is inoperable in either ADS trip system. As described in Traveler TSTF-592, the manual initiation Function is not assumed in any accident or transient analysis and therefore, there is not a loss of credited ADS initiation capability with this Function inoperable. Current remedial actions require restoring a

channel to operable status within 8 days. Traveler TSTF-592 describes that the current remedial actions for inoperable manual initiation channels are overly restrictive.

Restoration of a manual initiation channel to operable status ensures the overall redundancy and diversity of the ADS functions. New remedial actions associated with the manual initiation Function are addressed in section 3.3.4 of this SE.

3.3.1 New Condition H

NUREG-1433 and NUREG-1434 STS 3.3.5.1 new Condition H states “As required by Required Action A.1 and referenced in Table 3.3.5.1-1.” This proposed change aligns with the proposed change to Table 3.3.5.1-1 discussed in section 3.1 of this SE. The new Condition H wording is the same as the current Condition G wording.

The NRC staff reviewed Traveler TSTF-592 and concluded that the proposed new Condition H is appropriate. The NRC staff’s rationale is that new Condition H is treated the same as current Condition G, that is “As required by Required Action A.1 and referenced in Table 3.3.5.1-1.” This change is necessary because it is a conforming change that is consistent with the proposed changes to STS Table 3.3.5.1-1 and is necessary to implement new Required Actions and associated Completion Times. Therefore, based on the discussion above, the NRC staff finds the proposed new Condition H acceptable.

3.3.2 New Required Action H.1 and Associated Completion Time

NUREG-1433 STS 3.3.5.1 new Required Action H.1 states, “Declare ADS valves inoperable,” with a Completion Time of “1 hour from discovery of loss of ADS initiation capability in both trip systems.” Required Action H.1 is modified by two Notes. Note 1 states, “Only applicable for Functions 4.e, 4.f, 5.e, and 5.f.” Note 2 states, “Only applicable when both ADS trips systems are inoperable due to Core Spray/LPCI Pump Discharge Pressure – High channels inoperable.”

NUREG-1434 STS 3.3.5.1 new Required Action H.1 states, “Declare ADS valves inoperable,” with a Completion Time of “1 hour from discovery of loss of ADS initiation capability in both trip systems.” Required Action H.1 is modified by two Notes. Note 1 states, “Only applicable for Functions 4.e, 4.f, and 5.e.” Note 2 states, “Only applicable when both ADS trips systems are inoperable due to LPCS/LPCI Pump Discharge Pressure – High channels inoperable.”

By Note 1, new Required Action H.1 is applicable to Functions associated with pump pressure channels. This Note indicates that not all the Functions that are associated with new Condition H are applicable to the new Required Action H.1. The Functions that are not identified in the Note are excluded from the Required Action. The excluded Functions are associated with manual initiation. The manual initiation Function is addressed in new Required Action H.3 and evaluated in section 3.3.4 of this SE.

There are two ADS trip systems, designated as ADS Trip Systems A and B. A single ADS trip system can initiate opening of the ADS valves constituting “ADS initiation capability.” Thus, “ADS initiation capability” is lost when both trip systems are unable to initiate opening of the ADS valves. Due to the proposed Note 2, new Required Action H.1 is only applicable when multiple low pressure pump discharge pressure - high channels are inoperable such that both ADS Trip Systems A and B lose initiation capability and are inoperable.

New Required Action H.1 provides requirements that address the loss of Trip Systems A and B due to inoperable pump pressure channels. New Required Action H.1 is intended to ensure that appropriate actions are taken if a combination of pump pressure channels are inoperable such that neither ADS Trip System A nor B has two operable pressure channels associated with one low-pressure ECCS pump.

The NRC staff reviewed Traveler TSTF-592 and concluded that the proposed new Required Action H.1 and associated Completion Time are appropriate. The NRC staff's rationale is that the proposed remedial actions for a loss of automatic initiation capability in both ADS trip systems are treated the same as the current remedial actions for a loss of automatic initiation capability in both ADS trip systems (see existing Required Action G.1 and its associated Completion Time). Therefore, because the proposed remedial actions ensure that appropriate actions would be taken for inoperable pump pressure channels that result in a loss of automatic initiation capability in both ADS trip systems, consistent with existing Required Action G.1 and associated Completion Time, the NRC staff finds the proposed new Required Action H.1 and associated Completion Time are acceptable.

3.3.3 New Required Action H.2 and Associated Completion Times

NUREG-1433 STS 3.3.5.1 new Required Action H.2 states, "Restore affected channels to OPERABLE status," with Completion Times the same as the Completion Times for current Required Action G.2. Required Action H.2 is modified by two Notes. Note 1 states, "Only applicable for Functions 4.e, 4.f, 5.e, and 5.f." Note 2 states, "Only applicable when one ADS trip system is inoperable due to Core Spray/LPCI Pump Discharge Pressure – High channels inoperable."

NUREG-1434 STS 3.3.5.1 new Required Action H.2 states, "Restore affected channels to OPERABLE status," with Completion Times like the Completion Times for current Required Action G.2. Required Action H.2 is modified by two Notes. Note 1 states, "Only applicable for Functions 4.e, 4.f, and 5.e." Note 2 states, "Only applicable when one ADS trip system is inoperable due to LPCS/LPCI Pump Discharge Pressure – High channels inoperable."

By Note 1, new Required Action H.2 is only applicable to Functions associated with pump pressure channels. This Note indicates that not all the Functions that are associated with new Condition H are applicable to the Required Action H.2. The Functions that are not identified in the Note are excluded from the Required Action. The excluded Functions are associated with manual initiation. The manual initiation Function is addressed in new Required Action H.3 and evaluated in section 3.3.4 of this SE.

There are two ADS trip systems, designated as ADS Trip Systems A and B. A single ADS trip system can initiate opening of the ADS valves constituting "ADS initiation capability." Thus, the redundancy of "ADS initiation capability" is lost when one trip system is unable to initiate opening of the ADS valves. By Note 2, new Required Action H.2 is only applicable when multiple low pressure pump discharge pressure - high channels are inoperable such that one ADS trip system loses initiation capability and is inoperable.

New Required Action H.2 provides requirements that address the loss of redundancy between Trip Systems A and B due to inoperable pump pressure channels. New Required Action H.2 is intended to ensure that appropriate actions are taken if there are not two operable pump

pressure channels associated with one low pressure pump within one ADS trip system, which would result in loss of automatic initiation capability for an ADS trip system.

The NRC staff reviewed Traveler TSTF-592 and concluded that the proposed new Required Action H.2 and associated Completion Times are appropriate. The NRC staff's rationale is that the remedial actions for the loss of redundant automatic initiation capability (i.e., loss of automatic initiation capability for one ADS trip system) due to pump pressure channels are treated consistent with the current remedial actions for the loss of redundant automatic initiation capability (see existing Required Action G.2 and its associated Completion Times). Additionally, it was noted that both Completion Times contain a modified "time zero" associated with the discovery of a loss of ADS initiation capability in one trip system for consistency with STS Section 1.3. Therefore, because the proposed new remedial actions ensure that appropriate actions would be taken for inoperable pump pressure channels that result in a loss of automatic initiation capability for one ADS trip system, consistent with existing Required Action G.2 and associated Completion Times and STS Section 1.3, the NRC staff finds the proposed new Required Action H.2 and associated Completion Times acceptable.

3.3.4 New Required Action H.3 and associated Completion Time

NUREG-1433 and NUREG-1434 STS 3.3.5.1 proposed new Required Action H.3 states, "Restore channel to OPERABLE status" with a Completion Time of 30 days.

Proposed new Required Action H.3, unlike proposed new Required Actions H.1 and H.2 described above, has no Note that limits the applicable Functions. Therefore, proposed new Required Action H.3 is applicable to all Functions that reference Condition H in STS Table 3.3.5.1-1. The Functions that reference Condition H in STS Table 3.3.5.1-1 are associated with instrumentation for pump pressure and manual initiation. In particular, the excluded Function (i.e., manual initiation) from new Required Actions H.1 and H.2 is addressed in proposed new Required Action H.3.

There are two ADS trip systems, designated as ADS Trip Systems A and B. A single ADS trip system can initiate opening of the ADS valves constituting "ADS initiation capability." The proposed new Required Action H.3 is intended to ensure that appropriate actions are taken if inoperable channels do not result in a loss of automatic initiation capability in either trip system. For example, the proposed new Required Action H.3 addresses the condition of inoperable pump pressure channels where there is no loss of ADS initiation capability in both trip systems (addressed by Required Action H.1) and there is no loss of redundant ADS initiation capability (addressed by Required Action H.2). In addition, the proposed new Required Action H.3 addresses the condition of inoperable channels associated with manual initiation. According to Traveler TSTF-592, the manual initiation Function is not credited in any accident or transient analysis.

The NRC staff reviewed Traveler TSTF-592 and concluded that the proposed new Required Action H.3 and associated Completion Time are appropriate. The NRC staff's rationale is that the proposed new remedial action ensures that appropriate actions are taken if inoperable channels result in no loss of automatic initiation capability in either ADS trip system; however, the inoperable channels do require restoration per STS Table 3.3.5.1-1 to ensure overall redundancy and diversity of the ADS functions. The new Completion Time ensures that the plant will not be operated in a reduced capability configuration for a lengthy timeframe. The 30-day Completion Time is based on operating experience, the consideration that there are

multiple channels available for meeting the lower pressure ECCS pump discharge pressure permissive, and the availability of the automatic ADS initiation. Therefore, because the proposed new remedial action ensures that appropriate actions would be taken for inoperable channels that result in no loss of automatic initiation capability for either ADS trip system, in a reasonable timeframe, the NRC staff finds the proposed new Required Action H.3 and associated Completion Time acceptable.

## 3.4 Evaluation of New Action I

NUREG-1433 and NUREG-1434 STS 3.3.5.1 currently reference Condition H as the default action when the Required Action and associated Completion Time of an associated Condition is not met.

Traveler TSTF-592 proposed to revise NUREG-1433 and NUREG-1434 STS 3.3.5.1 to create a new Condition H and associated remedial actions, which is evaluated in section 3.3 of this SE. Therefore, Traveler TSTF-592 proposed to renumber the current default action (Condition H) as Condition I. In addition, the proposed new Condition H was included in the scope of the proposed new Condition I.

The NRC staff finds that the new proposed default action, Condition I and associated remedial actions, are acceptable because it is a conforming change necessary to implement the proposed new Condition H.

## 3.5. Evaluation of Proposed Changes to the Presentation of RICT

Traveler TSTF-592, Section 3, “Technical Evaluation,” describes that there are three instances in the STS where the presentations of Completion Times with the option to apply RICT are inconsistent. This inconsistency was introduced in TSTF-505, “Provide Risk-Informed Extended Completion Times,” Revision 2, which was incorporated into Revision 5 of the STS.

Section 2.2 of this SE identifies the proposed changes to NUREG-1433 and NUREG-1434 presentation of RICT to address the three instances in the STS where the presentation of Completion Times with the option to apply RICT are inconsistent. The proposed changes fix inconsistencies with the presentation of Completion Times that incorporate a RICT option and contain the expression “from discovery,” which indicates the Completion Time begins when the conditions in the Completion Time are satisfied.

The NRC staff reviewed the proposed changes to the presentation of RICT described in section 2.2 of this SE. The NRC staff finds the proposed changes provide consistency and clarity, without changing the intent of the STS, and therefore are acceptable.

## 4.0 CONCLUSION

The NRC staff concludes that the proposed changes to STS 3.3.5.1 for BWR/4 and BWR/6 in Traveler TSTF-592 are acceptable because the remedial actions to be taken until the LCO can be met provide protection to the health and safety of the public. The NRC staff also concludes that there is reasonable assurance that plants adopting TSTF-592 will continue to ensure that when LCO 3.3.5.1 is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met. Therefore, the NRC staff finds that the

proposed changes to STS 3.3.5.1 are acceptable because they continue to meet the requirements of 10 CFR 50.36(c)(2)(i).

Principal Contributors: C. Ashley, NRR/DSS/STSB
N. Karipineni, NRR/DSS/SCPB
H. Vu, NRR/DEX/EICB

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