February 12, 2020

TSTF-19-14
PROJ0753

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

SUBJECT: TSTF Response to NRC Questions on TSTF-582, "RPV WIC Enhancements"

On December 17, 2019, the NRC provided a Request for Additional Information (RAI) regarding TSTF-582, Revision 0, "RPV WIC Enhancements" (ADAMS Accession Number ML19351D783).

The TSTF's response to the NRC RAI is attached.

Should you have any questions, please do not hesitate to contact us.

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TSTF Response to NRC Request for Additional Information Regarding TSTF-582, "RPV WIC Enhancements"

The NRC questions are repeated below in italics, followed by the TSTF response.

By letter dated August 28, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19240A260), the Technical Specifications Task Force (TSTF) submitted traveler TSTF-582, Revision 0, "RPV [Reactor Pressure Vessel] WIC [Water Inventory Control] Enhancements," to the U.S. Nuclear Regulatory Commission (NRC). Traveler TSTF-582, Revision 0, proposes changes to the Standard Technical Specifications (STS) for boiling water reactor (BWR) General Electric (GE) plant designs. These changes would be incorporated into future revisions of NUREG 1433 and NUREG-1434. This traveler would be made available to licensees for adoption through the consolidated line item improvement process (CLIIP).

The proposed change would revise technical specifications (TSs) related to RPV WIC to incorporate operating experience in the STS and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (ADAMS Accession No. ML16074A448).

During the review of the submitted TSTF traveler, the NRC staff found the following additional information is needed to complete the instrumentation and controls branch (EICB) review. The responses are required to ensure that the requirements of Title 10 of the Code of Federal Regulations (10 CFR) 50.3(c)(2) and 10 CFR 50.36(c)(3) are met.

EICB-RAI 1

Section 3.0 of the submitted TSTF-582 provides the technical evaluation of the proposed change. TSTF-582 proposes to eliminate the requirement for a manual emergency core cooling systems (ECCS) initiation signal to start the required ECCS injection/spray subsystem. Further, part of Improvement 1 states, "TS 3.5.2 Surveillance Requirements (SRs) related to manual initiation using the ECCS signal (such as verifying automatic alignment of valves on an initiation signal) are eliminated. Related to this change, the TS 3.3.5.2 functions, Surveillance Requirements, and Actions that only support manual initiation using an ECCS signal (including interlocks and minimum flow instruments) are eliminated."

a. *The traveler states that it is not necessary to have requirements for BWR/4 and BWR/6 functions 1.a and 2.a, injection valve permissives for low pressure core spray and low pressure coolant injection because in Modes 4 and 5 the reactor pressure is well below the ECCS maximum design pressure. Please describe how an ECCS subsystem will achieve manual start without its valve permissive (e.g., if the permissive input circuits are not available, can manual subsystem start be achieved?)*

b. *The traveler states that it is not necessary to have Mode 4/5 pump minimum flow requirements for pump low discharge pressure bypass for BWR/4 Functions 1.b and 2.b, and BWR/6 Functions 1.b, 1.c, 2.b, 3.c, and 3.d because the ECCS pump will be started manually by the operator after aligning the valves needed to inject into the RPV. The Bypass function serves to protect a pump from overheating when the pump is operating, and the associated injection valve is not fully open. Please explain how the pump will be*

> *protected from damage during startup before the flow rate is adequate (e.g., operator actions taken, availability of other instruments or indications for low flow, etc.)*

Response:

The definition of Operable/Operability in Section 1.1 of the Technical Specifications (TS) states:

> A system, subsystem, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s). (emphasis added)

Note that the definition specifies that for a system to be capable of performing its specified safety function all necessary instrumentation and controls must be capable of performing their related support function.

In the TS that apply in operating Modes, instrumentation and controls functions are usually specified by a separate TS that ensures the instrumentation and controls can perform the functions assumed in the safety analysis, such as actuation at specific setpoints. However, in shutdown modes the instrumentation and controls typically have no specific safety analysis requirements, and the only TS requirements are those necessary to support the operation of other equipment as described in the Limiting Condition for Operation (LCO) Bases for the supported system. In the Standard Technical Specifications, the LCO Bases describe how the definition of operability is applied for the specific system required to be operable by the LCO.

As an example, consider TS 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System – Cold Shutdown." The LCO Bases states:

> Two RHR shutdown cooling subsystems are required to be OPERABLE, and when no recirculation pump is in operation, one RHR shutdown cooling subsystem must be in operation. An OPERABLE RHR shutdown cooling subsystem consists of one OPERABLE RHR pump, one heat exchanger, and the associated piping and valves. … Additionally, each shutdown cooling subsystem is considered OPERABLE if it can be manually aligned (remote or local) in the shutdown cooling mode for removal of decay heat.

TS 3.4.9 is required to be met in Mode 4. For an RHR shutdown cooling system to be operable, it must be supported by a heat exchanger. However, the cooling water for the heat exchanger, the RHR Service Water (RHRSW) System, is only required to be operable in Modes 1, 2, and 3 by TS 3.7.1, "RHRSW System." The RHRSW System requirements in Mode 4 are defined by the TS 3.4.9 RHR Shutdown Cooling System requirement to remove decay heat. If that function can be performed, the RHR Shutdown Cooling System is operable.

Similarly, there are no explicit TS instrumentation and controls requirements that support operation of RHR Shutdown Cooling in Mode 4. However, in order to perform its function there must be instrumentation and controls to monitor temperature and flow and to manipulate valves. Those functions are not explicitly required by the TS because they are integral to the ability of the RHR Shutdown Cooling System to perform its TS function as described in the LCO Bases. Such systems are referred to as "non-TS support systems" and are required by the definition of operability.

Applying these concepts to TSTF-582, the proposed BWR/4 LCO Bases for TS 3.5.2, "Reactor Pressure Vessel Water Inventory Control (RPV WIC)," state (additions shown in italics):

> One low pressure ECCS injection/spray subsystem is required to be OPERABLE and capable of being manually *aligned and* started *from the control room* to provide defense-in- depth should an unexpected draining event occur. *OPERABILITY of the ECCS injection/spray subsystem includes any necessary valves, instrumentation, or controls needed to manually align and start the subsystem from the control room*. A low pressure ECCS injection/spray subsystem consists of either one Core Spray (CS) subsystem or one Low Pressure Coolant Injection (LPCI) subsystem. Each CS subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank (CST) to the RPV. Each LPCI subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. In MODES 4 and 5, the RHR System cross tie valve is not required to be closed.

The BWR/6 TS 3.5.2 LCO Bases are similar. The necessary valves, instrumentation, or controls needed to manually align and start the ECCS injection/spray subsystem are non-TS support systems as described in the definition of operability.

In response to the "a" part of the question, in order for the required ECCS subsystem to be operable, it must be capable of being aligned and started from the control room, including any necessary valves, instrumentation, or controls needed to manually align and start the subsystem from the control room. The most straightforward method of satisfying the operability requirements is to maintain the injection valve permissives available. However, if outage operations require defeating the valve permissives, other actions can be taken to ensure the ECCS subsystem can be aligned and started from the control room, such as the use of jumpers or bypasses, locking open the valve, or alternate system alignments. The use of any such alternatives will be controlled by plant procedures. If the ECCS subsystem can be aligned and started from the control room, it is capable of performing its specified safety function and is operable.

In response to the "b" part of the question, there are indications of valve position, pump flow, and motor temperature available in the control room. If operators start a pump manually with the discharge valve closed, there is procedural guidance to establish a certain flow within a certain time to avoid damage to the pump. The low-pressure condition of the RPV in Modes 4 and 5 also facilitates adequate pump flow to avoid damage. In the unlikely event an ECCS subsystem is needed as a defense-in-depth measure to respond to a draining event, there is adequate time (at least one hour) for the operator to follow plant procedures for starting a pump.

<u>EICB-RAI 2</u>

TSTF-582 proposes to delete the BWR/6 Function 3.b High Pressure Core Spray (HPCS) suction switchover at low level from the condensate storage tank to the suppression pool from automatic mode to manual action (Reference page 9 of TSTF-582 submittal).

a. *Without this automatic function, please describe the manual actions would the control room operator take to ensure that the HPCS has a sufficient water source.*

b. *Please describe the indications and instruments that are available to the operator to support these actions.*

c. *Clarify how manual water source switchover can be achieved if the permissive input is not available.*

<u>Response</u>

BWR/6 TS 3.5.2 requires one injection/spray ECCS subsystem to be operable. As described in the LCO Bases, an operable injection/spray ECCS subsystem is either one of the three Low Pressure Core Injection (LPCI) subsystems, a Low Pressure Core Spray (LPCS) subsystem, or a HPCS subsystem. SR 3.5.2.2 verifies that there is sufficient water in the suppression pool to support the required LPCI or LPCS subsystem. SR 3.5.2.3 verifies that there is sufficient water in the suppression pool or condensate storage tank to support a required HPCS subsystem. The condensate storage tank is only required if HPCS is the credited ECCS subsystem and the condensate storage tank is the credited water source.

SR 3.5.2.3 requires verification of the suppression pool water level or the condensate storage tank water level. LCO 3.5.3 and SR 3.5.2.3 do not require the ability to change the HPCS subsystem water source from the condensate storage tank to the suppression pool should HPCS be needed as a defense-in-depth measure to respond to a draining event. As stated in the SR 3.5.2.3 Bases:

> When the suppression pool level is < [12.67 ft], the HPCS System is considered OPERABLE only if it can take suction from the CST and the CST water level is sufficient to provide the required NPSH for the HPCS pump. Therefore, a verification that <u>either</u> the suppression pool water level is ≥ [12.67 ft] <u>or</u> the HPCS System is aligned to take suction from the CST and the CST contains ≥ [170,000] gallons of water, equivalent to [18] ft, <u>ensures that the HPCS System can supply makeup water to the RPV</u>. (emphasis added)

In response to part "a" of the question, SR 3.5.2.2 and SR 3.5.2.3 ensure that a required HPCS subsystem has a sufficient water source to act as a defense-in-depth measure to respond to a draining event. No credit is taken for changing the HPCS subsystem water source from the condensate storage tank to the suppression pool in response to a draining event.

In response to part "b" of the question, there are control room indications of condensate storage tank level and suppression pool level that may be used to perform SR 3.5.2.2 and SR 3.5.2.3. As discussed above, there are no actions required to change the HPCS water source.

In response to part "c" of the question, LCO 3.5.2 does not require that the HPCS water source be capable of being changed from the condensate storage tank to the suppression pool if called on as a defense-in-depth measure in response to a draining event. While not required for HPCS subsystem operability, there are procedures to change the HPCS water source from the condensate storage tank to the suppression pool. These procedures may require actions to be taken outside of the control room, which is acceptable because a change in HPCS water source is not required for HPCS operability.