December 8, 2015

Technical Specifications Task Force
11921 Rockville Pike, Suite 100
Rockville, MD 20852

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING TRAVELER TSTF-542, REVISION 1, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (TAC NO. MF3487)

Dear Members of the Technical Specifications Task Force:

By letter dated December 31, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15258A850), you submitted to the U.S. Nuclear Regulatory Commission (NRC) Traveler TSTF-542, Revision 0, “Reactor Pressure Vessel Water Inventory Control.” By letter dated September 15, 2015 (ADAMS Accession No. ML15258A850), you submitted responses to NRC staff requests for additional information (RAI) and Revision 1 of Traveler TSTF-542, “Reactor Pressure Vessel Water Inventory Control.”

Based on its review of Revision 1 of TSTF-542, the NRC staff has determined that additional information is needed. On December 1, 2015, Brian Mann, Vice President of Industry Programs, EXCEL Services Corporation, and I agreed that the NRC staff will receive your response to the enclosed RAI questions within 90 days of the date of this letter.

The review schedule provided in the acceptance letter dated May 21, 2014 (ADAMS Accession No. ML14139A115), has been revised as follows:

MILESTONE	SCHEDULE DATE
Issue Draft Safety Evaluation	July 14, 2016
Issue Final Safety Evaluation	September 20, 2016

If you have any questions, please contact me at (301) 415-1774 or via e-mail to Michelle.Honcharik@nrc.gov.

Sincerely,

/RA/

Michelle C. Honcharik, Senior Project Manager
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Enclosure:
As stated

Project No. 753

cc: See next page

If you have any questions, please contact me at (301) 415-1774 or via e-mail to Michelle.Honcharik@nrc.gov.

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Michelle C. Honcharik, Senior Project Manager
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cc: See next page

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

TSTF-542, REVISION 1, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL"

TAC NO. MF3487

By letter dated December 31, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15258A850), the Technical Specifications Task Force (TSTF) submitted to the U.S. Nuclear Regulatory Commission (NRC) Traveler TSTF-542, Revision 0, "Reactor Pressure Vessel Water Inventory Control." By letter dated September 15, 2015 (ADAMS Accession No. ML15258A850), the TSTF submitted responses to NRC staff requests for additional information (RAI) and Revision 1 of Traveler TSTF-542, "Reactor Pressure Vessel Water Inventory Control." Based on its review of Revision 1 of TSTF-542, the NRC staff has determined that additional information is needed. Question number 1 below is from the Instrumentation and Controls Branch; Question numbers 2 through 6 are from the Reactor Systems Branch; Question numbers 7 through 13 are from the Technical Specifications Branch.

1. Ten Second Delay

Enclosure 6, page 210, Boiling Water Reactor (BWR)/4, Bases, states:

> The LPCI [low pressure coolant injection] minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is provided to limit reactor vessel inventory loss during the startup of the Residual Heat Removal (RHR) shutdown cooling mode.

Please provide further details as to why the ten second delay is needed. If the core spray or LPCI is going to be adding water, how is it that there would be a reactor vessel inventory loss during startup of RHR shutdown cooling mode?

2. Table/graph on Drain Time Calculation

The response for Question number 20 of the RAI regarding TSTF-542, Revision 0, states that licensees may choose to use a simple table or graph that provides a conservatively calculated (i.e., bounding) drain time for ranges of penetration flow path cross-sectional areas and water heights. The NRC staff requests that the simple table or graph recommended in the RAI response be provided. Additionally, the NRC staff requests a clarification regarding how the simple table or graph will be used in comparison to the drain time definition.

3. Decay Heat Requirement

The drain time is monitored by the operators per surveillance requirements in technical specification (TS) 3.5.2, "RPV [reactor pressure vessel] Water Inventory Control." The NRC staff noted that other parameters are not being monitored in conjunction with the drain time. With a draining event in Modes 4 or 5 with fuel still in the core, the change in water inventory can thus change the heat up rate for the coolant. The proposed TS is performance based using the drain time parameter defined in the TS Section 1.1, "Definitions." Decay heat for this

performance based TS is important in relation to injection source water when a drain event occurs. The NRC staff requests that an explanation be provided for why decay heat was not included as a requirement for this performance based TS.

4. Suspension of Operations to Prevent a Drain Down Event

Technical Specification 3.5.2, "RPV Water Inventory Control," states in its limiting condition for operation (LCO) that one low pressure emergency core cooling system (ECCS) injection/spray subsystem shall be OPERABLE for Modes 4 and 5 for BWR/4, and states that one ECCS injection/spray subsystem shall be OPERABLE for Modes 4 and 5 for BWR/6. The Standard TS (STS) for BWR/4 states that two low pressure ECCS injection/spray subsystems shall be OPERABLE for the applicable Modes. The STS for BWR/6 states that two ECCS injection/subsystem shall be OPERABLE for the applicable Modes. In review of the revision to the Traveler, it is stated that the redundancy of two ECCS injection/spray subsystems are not required for a defense-in-depth measure when, consistent with other events considered during shutdown, no additional single failure is assumed. The drain time controls, in addition to the required ECCS injection/subsystem, provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the top of active fuel (TAF).

Additionally, the proposed revisions to TS 3.5.2, "RPV Water Inventory Control," do not include any action to suspend all actions with the potential for draining the reactor vessel when there are no pumps available. The Required Actions for Condition B do not include either an alternate source capable of injecting water or to suspend operations that may cause a drain down event. The NRC staff requests an explanation for if the Required Actions are not met to restore an injection source that it is not considered to suspend operations to prevent a drain down event.

5. Clarification Regarding Calculation of Drain Time

The definition of drain time is proposed in the markups for TS Section 1.1, "Definitions." The NRC staff reviewed the provided definition for its assumptions and exceptions for determining drain time. The NRC staff requests that a clarification regarding how the drain time is calculated be provided in regards to: (1) what flow paths penetrations below TAF that will be part of the drain time calculation and (2) would penetrations just above TAF be excluded from this specification.

6. Clarification of Closed System Definition

The drain time definition provided in the Traveler states the following:

> b) The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:
>
> 1. Penetration flow paths connected to an intact closed system…

The TS Bases for Surveillance Requirement (SR) 3.5.2.1 states that the definition of drain time excludes from the calculation those penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths. Determination that a system is intact and closed or isolated must consider the status of branch lines and ongoing plant maintenance and testing activities. The NRC staff requests that an explanation be provided regarding if the definition of a closed system considers the inclusion of a large tank.

7. Definition of Drain Time

The proposed definition of drain time contains criteria for excluding penetration flow paths from the calculation of drain time. One of the criteria for exclusion is a penetration flow path that contains an isolation device that can be closed prior to the RPV water level being equal to TAF by a dedicated operator who is trained, in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation device without offsite power.

The qualifications of the dedicated operator were the subject of Question number 3 in the RAI regarding TSTF-542, Revision 0. In that RAI, the NRC staff requested that a revision to the definition be provided that incorporates a dedicated qualified non-licensed operator or licensed operator into this exception. In response, the TSTF proposed the insertion of the phrase "[a dedicated operator] who is trained…"

The NRC staff believes a further description of the term "trained' is needed. The additional detail should ensure that the individual dedicated to this task has the necessary knowledge, skills and ability to properly close the isolation device and verify that it is fully closed.

8. Mitigating Actions

Proposed new TS 3.5.2 requires that the drain time of the RPV water inventory to the TAF be ≥ 36 hours.

Condition C applies when the drain time is <36 hours, and ≥ 8 hours. The Required Actions are to verify containment boundary is capable of being established, that each [secondary] containment penetration flow path is capable of being isolated, and that one standby gas treatment subsystem is capable of being placed in operation in less than the drain time. The Completion Time for these actions is 4 hours.

Condition D applies when the drain time is < 8 hours. The Required Action D.1 is to initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours. Required Actions D.2, D.3 and D.4 require immediately initiating action to establish [secondary] containment boundary, to isolate each [secondary] containment penetration flow path or verify it can be manually isolated from the control room, and to verify one standby gas treatment subsystem is capable of being placed in operation.

When the term “immediately” is used as a Completion Time, it means the Action should be pursued without delay and in a controlled manner. This is shortest Completion Time available in the TS.

The NRC staff requested additional information on the technical basis for the proposed Required Actions for Conditions C and D in Question number 7 of the NRC staff’s RAI regarding TSTF 542, Revision 0. The NRC staff has reviewed the information provided and finds that additional clarification is needed.

Condition C is applicable when the Drain Time is < 36 hours and ≥ 8 hours. The action to restore compliance with the LCO is always implied within the TS. However, there is no explicit requirement to restore the Drain Time. Please provide additional discussion of safety margin and defense-in-depth considerations for operation in this condition for an unlimited time period.

Condition D is applicable when the drain time is < 8 hours. Required Action D.3 requires “initiate action to isolate each [secondary] containment penetration flow path or verify it can be manually isolated from the control room immediately. The NRC staff requests the technical basis for not requiring that [secondary] containment flow path be isolated. At what point would complete isolation of [secondary] containment flow paths be necessary?

9. Justification for Required Actions A.1, B.1, and C.1

The existing LCO 3.5.2 requires two ECCS subsystems to be operable in Mode 4 and Mode 5, except with spent fuel storage gates removed and water level ≥ [23 ft] above the reactor pressure vessel flange. With one required subsystem inoperable, Action A.1 requires restoration within 4 hours. In this Condition, there would still be one operable ECCS subsystem.

If the Completion Time for Action A.1 is not met, Action B.1 requires suspension of operations with the potential to drain the reactor vessel (OPDRVs) immediately.

If both required ECCS subsytems are inoperable, Action C.1 requires suspension of OPDRVs immediately, and Action C.2 requires restoration of one ECCS subsystem to operable status within 4 hours.

If the Completion Time for Action C.2 is not met, then Required Actions D.1, D.2, and D.3 require immediate restoration of secondary containment and one SGT subsystem to operable status.

The proposed LCO 3.5.2 requires one ECCS subsystem to be operable in Modes 4 and 5. With the required ECCS subsystem inoperable (i.e., no operable ECCS subsystems), Required Action A.1 requires restoration within 4 hours. This Condition is comparable to Condition C in the existing LCO 3.5.2.

However, the existing LCO 3.5.2 requires termination of OPDRVs in this condition. There is no corresponding requirement to verify or restore the Drain Time to ≥ 36 hours.

The NRC staff requested additional detail on the basis for the proposed Completion Times in Question number 4 of the RAI regarding TSTF-542, Revision 0. The NRC staff has reviewed the technical justification provided and finds that additional technical justification is needed.

10. Accommodations for Pre-Planned Maintenance Activities

Proposed new TS 3.5.2 does not have any accommodations for pre-planned evolutions that necessitate a drain time of < 8 hours. It seems appropriate to permit pre-planned evolutions provided the mitigating measures (e.g., secondary containment integrity, ECCS subsystem operable, etc.) are put in place prior to the evolution. The LCO could be conditioned by a note to state this.

The NRC staff requested changes to the proposed TS 3.5.2 to accommodate preplanned activities in Question number 8 of the RAI regarding TSTF-542, Revision 0. The RAI response states that an additional separate Action for planned maintenance is not necessary. The NRC staff has reviewed the response and does not agree with this conclusion.

Please modify TS 3.5.2 to require the establishment of mitigative measures prior to initiating a planned evolution with a drain time < 8 hours.

11. Completion Time for Condition E

The proposed Condition E applies when the drain time is < 1 hour or the Completion Times of Condition C or D Actions are not met. Action E.1 requires restoring the drain time to ≥ 36 hours immediately.

In Question number 9 of the of the RAI regarding TSTF-542, Revision 0, the NRC staff requested additional discussion regarding the time required for recognition and mitigation of a draining event. In the response, the technical justification describes the response of a dedicated operator being credited for isolating a penetration flow path. However, this flow path would be omitted from the calculation of drain time.

Please provide a detailed evaluation of the time necessary to diagnose an unexpected drain event when the Control Room is required to dispatch an operator to manually isolate a flow path.

12. Lack of SR for Required ECCS Pump

Proposed new TS 3.5.2 does not contain any SRs to verify the required ECCS pump is capable of establishing the required flow. The existing SR 3.5.2.5, which verifies that the required ECCS pump develops the specified flow rate corresponding to a specified reactor pressure, is proposed to be deleted.

The technical justification in TSTF-542, Revision 1, states, in part, “it is not necessary to perform similar flow rate tests during the relatively small fraction of an operating cycle when the plant is in Modes 4 and 5….” There are no restrictions on the amount of time a unit may be in Modes 4 and 5. TS are intended to cover reasonably foreseen plant configurations. Therefore this is not a valid technical basis for deletion of an SR unless a restriction on the amount of time spent in Modes 4 and 5 is also proposed.

The existing SR 3.5.2.5 requires verification of flow rate as a function of system head corresponding to a specified reactor pressure. The Traveler contains a technical discussion that most penetration flow paths would only permit a drain rate of tens of hundreds of gallons per

minute. This discussion provides a technical basis for concluding that the acceptance criteria of SR 3.5.2.5 are conservative. As discussed in Question number 11 of the of the RAI regarding TSTF-542, Revision 0, the NRC staff position is that a SR is needed to verify the performance requirements for the low head ECCS pump relied upon for protection of SL 2.1.1.3.

Please modify proposed TS 3.5.2 to specify an appropriate SR to verify the operability of the required ECCS injection/spray subsystem pump.

13. Changes Since Revision 4 of NUREG Was Approved

Please review the Travelers that have been approved since Revision 4 to NUREG-1433 and NUREG-1434 and identify any changes to the TS that are included within the scope of proposed TSTF-542. Please provide a set of marked-up TS pages that reflect the currently-approved version of the STS.