October 10, 2014

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: TRAVELER TSTF-542, REVISION 0, "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 Accession No. ML14002A112), the Technical Specifications Task Force submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Traveler TSTF-542, Revision 0, "Reactor Pressure Vessel Water Inventory Control." Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. On October 7, 2014, Brian Mann, Vice President of Industry Programs, EXCEL Services Corporation, and I agreed that the NRC staff will receive your response to the enclosed request for additional information (RAI) questions within 90 days of the date of this letter. If you have any questions regarding the enclosed RAI questions, please contact me at 301-415-1774 or via e-mail at Michelle.Honcharik@nrc.gov.

Sincerely,

/RA/

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

Project No. 753

Enclosure:
As stated

cc w/encl.: See next page

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Letter to Technical Specifications Task Force from M. Honcharik dated October 10, 2014

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: TRAVELER TSTF-542, REVISION 0, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (TAC NO. MF3487)

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REQUEST FOR ADDITIONAL INFORMATION

TSTF 542, REVISION 0, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL"

TAC NUMBER MF3487

By letter dated December 31, 2013 (Agencywide Documents Access and Management System Accession No. ML14002A112), the Technical Specifications Task Force (TSTF) submitted TSTF-542, Revision 0, "Reactor Pressure Vessel Water Inventory Control," which requests to amend the Standard Technical Specifications (STS) in NUREG-1433 and NUREG-1434. TSTF-542 proposes to replace "operations with a potential for draining the reactor vessel" (OPDRV) with new requirements on reactor pressure vessel water inventory control, which requires the reactor pressure vessel water level to be greater than the top of the active fuel safety limit.

Background for Request #1

TSTF-542 proposes to delete mode 4, mode 5, and their associated footnote for select functions in TS 3.3.5.1A/B. Specifically, the functions affected are:

NUREG-1433 (BWR/4 Plants)

Function 1 Core Spray (CS) System

a. Reactor Vessel Water Level - Low Low Low, Level 1
c. Reactor Steam Dome Pressure - Low (Injection Permissive)
d. Core Spray Pump Discharge Flow - Low (Bypass)
e. Manual Initiation

Function 2 Low Pressure Coolant Injection (LPCI) System

a. Reactor Vessel Water Level - Low Low Low, Level 1
c. Reactor Steam Dome Pressure - Low (Injection Permissive)
f. LPCI Pump Start - Time Delay Relay
g. LPCI Pump Discharge Flow - Low Bypass
h. Manual Initiation

NUREG-1434 (BWR/6 Plants)

Function 1 LPCI-A and Low Pressure Core Spray (LPCS) Subsystems

a. Reactor Vessel Water Level - Low Low Low, Level 1
c. LPCI Pump A Start - Time Delay Relay
d. Reactor Steam Dome Pressure - Low (Injection Permissive)
e. LPCS Pump Discharge Flow - Low (Bypass)
f. LPCI Pump A Discharge Flow - Low (Bypass)
g. Manual Initiation

ENCLOSURE

Function 2 LPCI B and LPCI C Subsystems

a. Reactor Vessel Water Level - Low Low Low, Level 1
c. LPCI Pump B Start - Time Delay Relay
e. LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)
f. Manual Initiation

Function 3 High Pressure CS (HPCS) System

a. Reactor Vessel Water Level - Low Low, Level 2
c. Reactor Vessel Water Level - High, Level 8
d. Condensate Storage Tank Level - Low
f. HPCS Pump Discharge Pressure - High (Bypass)
g. HPCS System Flow Rate - Low (Bypass)
h. Manual Initiation

Relocating instrumentation Technical Specifications (TS) requirements to TS 3.5.2 is contrary to STS formatting conventions that have been in place for more than 36 years. The NRC staff does not agree with the relocation of these instruments.

The flow transmitters monitor the CS, LPCI, LPCS, and HPCS pump's discharge flow. When the pump is running and discharge flow is low enough that pump overheating may occur, the minimum flow return line valve is opened. In addition, the CS, LPCI, and LPCS systems also monitor the pressure in the reactor vessel to ensure that, before the injection valves open, the reactor pressure has fallen to a value below the CS, LPCS system's maximum design pressure thereby preventing system piping over pressurization. Upon further consideration of this change the NRC has determined these functions provide protection for system's pumps and piping and are necessary when the systems are in operation, regardless of whether the system initiated automatically or by manual initiation.

In addition, the relocation into TS 3.5.2 does not contain the number of required channels per function and the associated surveillance requirements that are currently required by TS 3.3.5.1A/B (i.e., channel check, channel calibration, logic system functional test, etc.).

Request for Additional Information #1

Please remove the proposed instrumentation changes from TS 3.3.5.1A/B functions:

NUREG-1433 (BWR/4 Plants)

Function 1 Core Spray (CS) System

c. Reactor Steam Dome Pressure - Low (Injection Permissive)
d. CS Pump Discharge Flow - Low (Bypass)
e. Manual Initiation

Function 2 Low Pressure Coolant Injection (LPCI) System

c. Reactor Steam Dome Pressure - Low (Injection Permissive)
g. LPCI Pump Discharge Flow - Low Bypass
h. Manual Initiation

NUREG-1434 (BWR/6 Plants)

Function 1 LPCI-A and Low Pressure Core Spray (LPCS) Subsystems

d. Reactor Steam Dome Pressure - Low (Injection Permissive)
e. LPCS Pump Discharge Flow - Low (Bypass)
f. LPCI Pump A Discharge Flow - Low (Bypass)
g. Manual Initiation

Function 2 LPCI B and LPCI C Subsystems

e. LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)
f. Manual Initiation

Function 3 High Pressure CS (HPCS) System

f. HPCS Pump Discharge Pressure - High (Bypass)
g. HPCS System Flow Rate - Low (Bypass)
h. Manual Initiation

For the other TS 3.3.5.1A/B functions not listed above, please provide a technical basis for deleting modes 4 and 5 for each stated function from TS 3.3.5.1A/B. The technical basis should not discuss or reference other STSs, and should be based on the individual instruments and the function they perform.

Background for Request #2

It appears to the NRC staff that the changes to TS 3.3.6.1A/B, TS 3.3.8.2A/B, and TS 3.6.1.3 are not specifically related to removing references to OPDRVs, and therefore, these changes should not be reviewed as part of this TSTF. The proposed TSTF should contain only those changes that remove reference to OPDRVs and add requirement for the reactor pressure vessel water inventory control limiting condition for operation (LCO). In addition, technical evaluation in TSTF-542 did not address the impact of the proposed changes on other TS, including but not limited to residual heat removal (RHR) shutdown cooling (SDC) hot/cold shutdown, RHR high water level, and RHR low water level.

Request for Additional Information #2

The proposed change to TS 3.6.1.3 deletes the entire Condition H instead of deleting, “or during operations with a potential for draining the reactor vessel (OPDRVs),” from the condition.

For TS 3.3.6.1A/B, TS 3.3.8.2A/B, and TS 3.6.1.3, please provide a technical evaluation that addresses, for each item being deleted (i.e., required action, applicable mode, function, etc.), whether or not it performs functions other than those related to OPDRVs. Include in the technical evaluation the impact of the proposed changes on other TS.

Note: If the item performs a function other than those related to OPDRVs, then the item cannot be deleted, therefore, the proposed deletion of the item should be removed.

Background for Request #3

Although a dedicated operator is used in the TS, the NRC staff does not think that it is appropriate to include reliance on a dedicated operator in the definition of drain time, as currently proposed. The NRC staff believes that more restrictions in the drain time definition are necessary in order to exempt a penetration flow path from the limiting drain rate calculation. The NRC staff believes that the operator should be a dedicated, qualified non-licensed operator. A qualified non-licensed operator has completed the station's formal qualification, has operated most systems through the qualification process, has extensive knowledge of the plant layout, and has experience with emergency operating procedures, and has most likely completed emergency/fire brigade training; therefore, it is prudent that a qualified non-licensed operator be used in order to exempt a penetration flow path from the limiting drain rate calculation.

Request for Additional Information #3

Please provide a revision to the limiting drain rate that incorporates a dedicated qualified non-licensed operator or licensed operator into the third exception.

Background for Request #4

The technical evaluation in TSTF-542 for the 4-hour completion time in Actions A and C states: "…and the low probability of an unexpected draining event that would result in loss of RPV [reactor pressure vessel] water inventory." However, the technical evaluation does not quantify the probability to show that it is low and does not discuss the basis behind the statement or how this statement was determined.

Request for Additional Information #4

Please provide the technical basis for the statement above including how it was determined, and include any calculations.

Background for Request #5 and #6

Because this TS only applies in modes 4 and 5 and the reactor is already shut down, the appropriate remedial actions to be taken must be specified in the TS. The proposed TS provides a set of Actions and states that they provide assurance that reactor vessel water level shall be greater than the top of active irradiated fuel (TAF) (i.e., Safety Limit 2.1.1.3) will be met.

Actions C and D are entered depending on the drain time. Action C requires verification within 4 hours that the secondary containment boundary, secondary containment penetration flow

path, and standby gas system are capable of being established, isolated, or placed in operation. Action D requires immediately initiating action to establish the secondary containment boundary, isolate secondary containment penetration flow path, verify standby gas system is capable of being placed in operation, and immediately verifying the availability of an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.

In addition, the TSTF proposes to allow crediting recirculated water in determining the water volume for the additional method of water injection and allows the water source to be shared between the emergency core cooling system (ECCS) injection/spray subsystem and the additional method of water injection.

Request for Additional Information #5

Please provide a technical basis that explains how Required Actions C.1, C.2, C.3, D.2, D.3, and D.4 provide assurance that the reactor water level shall be greater than the TAF, considering that they (1) do not restore the drain time LCO, (2) do not add or require additional water sources, and (3) the systems in these Required Actions are not capable of delivering water to the reactor vessel.

Request for Additional Information #6

Please provide a technical basis that explains how Required Action D.1 provides assurance that the reactor water level shall be greater than the TAF, considering that the additional water source is not required to be independent of the ECCS injection/spray subsystem water source; therefore it does not augment the ECCS injection/spray subsystem water source. In addition, please explain the technical basis for crediting recirculated water in the determination of the water volume. Additionally, please show how the recirculated water will be credited and provide an example.

Background for Request #7

TSTF-542 adds new Actions that address the drain time being < 36 hours. The technical evaluation in TSTF-542 for Conditions C and D states what the required actions are and the basis behind why the time for completion was chosen. However, the technical evaluation does not provide the rationale/adequate technical basis for the required actions that were chosen. In addition, it does not explain how the required actions provide an equivalent or improved level of safety compared to the current TS requirements.

Request for Additional Information #7

Provide the rationale/adequate technical basis for the required actions in Conditions C and D. Include in your discussion how an equivalent level of safety exists when compared to the current TS requirements.

Background for Request #8

TS 3.5.2 Required Action C.3 in TSTF-542 states, “Verify one standby gas treatment [(SBGT)] subsystem is capable of being placed in operation in less than the DRAIN TIME.” TS 3.5.2

Required Action D.4 in TSTF-542 states, “Initiative action to verify one standby gas treatment subsystem is capable of being placed in operation.” TS 3.5.2 Required Action D.4 seems to be the same action as TS 3.5.2 Required Action C.3, with a different time allowance.

Required Action C.3 allows 4 hours to verify that SBGT is capable of being placed in service and Required Action D.4 requires immediate action to verify that SBGT is capable of being placed in service and is continued until verification is complete. Required Action D.4 could be completed in a longer time than that allowed in Required Action C.3. However, Required Action D.4 is associated with a shorter drain time than that stated in Condition C and does not represent a more conservative action than that stated in Required Action C.3.

In addition, Required Action D.4 is not consistent with the approach taken in Required Actions D.2 and D.3. Required Actions C.1 and C.2 verifies the [secondary] containment boundary is capable of being established and each [secondary] containment penetration flow paths are capable of being isolated in less time than the drain time. Required Actions D.2 and D.3 require immediate action to establish the [secondary] containment boundary and isolate each [secondary] containment penetration flow path. However, Required Action D.4 does not require immediate action to place SBGT in service, which would be appropriate and consistent with Required Actions D.2 and D.3.

Furthermore, the NRC staff has reviewed the technical evaluation for Action D and is in agreement that compensatory measures need to be implemented, to ensure the ability to mitigate a radioactive release resulting from an unexpected draining event. Since the 8-hour drain time was chosen to allow most anticipated maintenance to be performed without entering Action D, the NRC staff believes that two different Actions are necessary, one for planned maintenance and one to be entered for other than planned maintenance. If Action D is entered for planned maintenance (i.e., anticipated maintenance) then the required actions should be established as part of the preparation for the maintenance, and that a completion time prior to beginning the planned maintenance is warranted. If Action D is entered for other than planned maintenance then it is prudent to immediately initiate action to establish the stated required action. In addition, we have determined that in either case it is necessary to place SBGT in operation in order to be able to mitigate a radioactive release from an unexpected draining event.

<u>Request for Additional Information #8</u>

Revise TSTF-542 to include Action D and Action E provided below.

D. DRAIN TIME < 8 hours for other than planned maintenance.	D.1 ----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	

		Verify an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND		
	D.2	Initiate action to establish [secondary] containment boundary.	Immediately
	AND		
	D.3	Initiate action to isolate each [secondary] containment penetration low path or verify it can be manually isolated from the control room.	Immediately
	AND		
	D.4	Initiate action to place standby gas treatment subsystem in operation.	Immediately
E. DRAIN TIME < 8 hours for planned maintenance.	E.1	----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
		Verify an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Prior to beginning the planned maintenance.

	AND E.2 Establish [secondary] containment boundary. AND E.3 Isolate each [secondary] containment penetration low path. AND E.4 Place a standby gas treatment subsystem in operation.	Prior to beginning the planned maintenance. Prior to beginning the planned maintenance. Prior to beginning the planned maintenance.

Background for Request #9

The technical evaluation in TSTF-542 for Condition E states what the Required Action is and why it should be performed. However, the technical evaluation does not provide the rationale/adequate technical basis for choosing the one-hour time nor does it explain how the one-hour time is sufficient time for an operator to take actions to mitigate an unexpected draining event.

Request for Additional Information #9

Please discuss the time it would take to recognize the draining event is occurring and provide the rationale/technical basis that explains the one-hour time is appropriate to allow an operator to mitigate the draining event. Include in the discussion draining events that are (1) mitigated by an operator inside the main control room and (2) mitigated by an operator outside the main control room.

Background for Request #10

The STS define operability as 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). The specified safety function(s) of systems, structures, or components specified safety function(s) in the licensing basis for the facility. The licensing basis is the set of NRC requirements applicable to a specific plant, plus a licensee's docketed and currently effective written commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis,

including all modifications and additions to such commitments over the life of the facility operating license. The set of NRC requirements applicable to a specific plant licensing basis include:

1. Applicable NRC regulations in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73, and 100 and appendices thereto.
2. Commission orders.
3. License conditions.
4. Exemptions.
5. TS.
6. Plant-specific design basis information defined in 10 CFR 50.2 and documented in the most recent update to the final safety analysis report (FSAR) as required by 10 CFR 50.71.
7. Licensee commitments in docketed licensing correspondence (such as licensee responses to NRC bulletins, Licensee Event Reports, generic letters, and enforcement actions), to the extent that the commitment is either required to be reflected in the FSAR pursuant to 10 CFR 50.71(e), a document subject to an NRC-defined change control process and criterion, or reflected in a legally binding requirement (e.g., license condition, TS).
8. Licensee commitments documented in NRC safety evaluations, which are reflected in a legally binding requirement (e.g., license condition, TS), in the FSAR pursuant to 10 CFR 50.71(e), or other document subject to an NRC-defined change control process and criterion.

The existing requirements in TS 3.5.2 are consistent with and do not conflict with TS 3.5.1. Because these requirements are consistent with each other, operability is the same for the ECCS injection/spray subsystem(s) in both TS 3.5.1 and TS 3.5.2 and is specified in the licensing basis. However, TSTF-542 is proposing a new TS 3.5.2, which is not consistent with TS 3.5.1. This inconsistency causes an operability conflict between TS 3.5.1 and TS 3.5.2. In addition, the new specified safety function(s) needed for TS operability has not been defined, nor has it been placed in the licensing basis.

Request for Additional Information #10

Please provide the new specified safety function(s) needed for TS operability, which will be placed in the licensing basis for licensees adopting TSTF-542, for NRC staff review.

Background for Request #11

The proposed TS provides a set of Actions and states that they provide assurance that reactor vessel water level shall be greater than the TAF (i.e., Safety Limit 2.1.1.3 will be met.). In addition, the TSTF states that the ECCS injection/spray subsystem provides defense-in-depth to the drain time. However, TSTF-542 proposes to delete current surveillance requirement (SR) 3.5.2.5, which verifies that the required ECCS pump develops the specified flow rate corresponding to a specified reactor pressure. The NRC staff believes it is good engineering judgment to require a SR that verifies that the pump can develop a flow rate corresponding to reactor pressure, especially when being relied on to maintain safety limit 2.1.1.3.

Request for Additional Information #11

Please remove the proposed change, and provide a SR that is consistent with the specified safety function(s) in the licensing basis.

Background for Request #12

Editorial errors have been identified in TSTF-542. Specifically, “start” is misspelled on page 11 and LCO 3.5.3 is referenced on page 37.

Request for Additional Information #12

Please correct these and any other editorial errors in TSTF-542.

Background for Request #13

The no significant hazards consideration determination section in TSTF-542 states that the operation of the equipment involved is not significantly different from the current methods of operation. The NRC staff does not agree with this statement. The current requirements in TS require more SSCs to be operable, and therefore available, in case of an unexpected reactor vessel draining event occurrence. In addition, if SSCs become inoperable the current TS requirements will preclude the licensee from performing OPDRVs. TSTF-542 proposes to delete many of the current requirements and that is a significant change considering that the SSCs may be unavailable to respond to an unexpected reactor vessel draining event.

Request for Additional Information #13

Please explain how the significant difference in the number of SSCs available to operate does not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any previously evaluated, and (3) involve a significant reduction in a margin of safety.

Background for Request #14

The model application does not provide a description of the plant’s SSCs that mitigate OPDRVs, which are currently in TS (i.e., primary containment, primary containment isolation, and drywell ventilation, or primary and secondary containment with standby gas treatment, etc.).

Request for Additional Information #14

Please update the model application to provide a description of the plant’s SSCs that mitigate OPDRVs, and are currently in TS.

Background for Request #15

Pages 4 and 5 of the model application contain a bulleted list that discusses plant-specific requirements that differ from the STS on which TSTF-542 is based. Most of the examples state

that they are justified by the discussion in TSTF-542 and they reference TSTF-542 Section 3.8.X. However, Section 3.8 does not exist in TSTF-542.

Request for Additional Information #15

Please update the model application bulleted list that discusses plant-specific requirements that differ from the STS on which TSTF-542 is based.

Regulatory Analysis Basis

10 CFR 50.90, *Application for amendment of license, construction permit, or early site permit* states:

> Whenever a holder of a license, including a construction permit and operating license under this part, and an early site permit, combined license, and manufacturing license under part 52 of this chapter, desires to amend the license or permit, application for an amendment must be filed with the Commission, as specified in §§ 50.4 or 52.3 of this chapter, as applicable, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Request for Additional Information #16

TSTF-542 proposes that a draining event with the reactor shutdown should be treated as an anticipated operational occurrence (AOO) under Section 3.1.2, Proposed Safety Basis. However, TSTF-542 does not explain how the Standard Review Plan (SRP) Chapter 15.0, "Introduction Transient and Accident Analysis," accident acceptance criteria are met for an AOO, which could fall into a "decrease in reactor coolant inventory," as described in Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Please provide the necessary information to explain how the accident acceptance criteria are met for an AOO in relation to a draining event of the reactor pressure vessel with the reactor shutdown.

Request for Additional Information #17

In TSTF-542 draining events of the reactor pressure vessel with the reactor shutdown are performed for mode 4 (cold shutdown) and 5 (refueling) analyses. There is also analysis performed for OPDRVs when in mode 1 (power operation). These analyses are performed and one analysis proves to be the bounding analysis. Please provide an explanation of these analyses, mode 1, mode 4, or mode 5, in regards to which is most bounding for OPDRVs.

Request for Additional Information #18

The FSAR contains multiple analyses for AOO events. TSTF-542 proposes to treat a draining event with the reactor shutdown as an AOO. Please provide what changes or effects would be made to the FSAR in relation to this new treatment of a draining event with the reactor shutdown.

Request for Additional Information #19

The Drain Time definition states that it is the time it would take for the water inventory in and above the RPV to drain to the TAF seated in the RPV with multiple assumptions. Assumption E states that realistic cross-sectional areas and drain rates are used. Please provide an explanation for what is meant by realistic cross-sectional areas and drain rates. If calculations are used, please provide calculations.

Request for Additional Information #20

The Drain Time definition ends with the following statement, "A bounding DRAIN TIME may be used in lieu of a calculated value." No bounding drain time value has been included with the application. Please provide how the drain time value is developed or remove the bounding drain time statement from the Drain Time definition.

Request for Additional Information #21

TS 3.5.2 Condition F states that required instrumentation or valve(s) not capable of automatically isolating penetration flow path(s) shall have a required action to calculate DRAIN TIME immediately. In accordance with the provided Drain Time definition, please provide how Drain Time for Condition F will be calculated including any calculations.

Request for Additional Information #22

TS SR 3.5.2.8 verifies the required ECCS injection/spray subsystem actuates on a manual initiation signal noting vessel injection/spray may be excluded. The manual initiation signal will only actuate provided the automatic initiation signal is also operable. A manual initiation for the subsystem can be performed via push button, actuating a pump, opening of a valve, manual alignment, etc. Please provide how the manual initiation signal for the required ECCS injection/spray subsystem will be actuated. If the operator is required to manually initiate the signal for required ECCCS injection/spray, please provide information to verify how the action is completed in the time required, if the operator(s) can complete it, and where the operators need to complete the action.

Request for Additional Information #23

Table 1, Changes to Current Technical Specifications for NUREG-1433, BWR/4 ISTS and NUREG-1434, BWR/6 ISTS, discusses TS 3.6.2.2 Suppression Pool Water Level Bases applicability. TS Bases 3.6.2.2 applicability references LCO 3.5.2 to reflect revisions made to TS 3.5.2. Please provide an explanation for the applicability bases for TS Bases 3.6.2.2 referencing TS 3.5.2.