

DATE

TSTF-17-13  
PROJ0753

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

**SUBJECT:** TSTF Response to NRC Issue with TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec"

**REFERENCE:** Letter from Kevin Hsueh (NRC) to the TSTF, "Issue with Technical Specifications Task Force Traveler TSTF-490, Revision 0, 'Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec'," dated April 27, 2016 (ADAMS Accession No. ML16113A402)

In the referenced letter, the NRC informed the TSTF of a concern identified regarding the approved TSTF traveler, TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." TSTF-490 was approved by the NRC on March 8, 2007. The traveler replaces the Reactor Coolant System (RCS) gross activity limit (E-bar) with a noble gas activity limit (dose equivalent Xenon-133).

The NRC staff concern was identified during review of a plant-specific amendment to adopt TSTF-490. In parallel with informing the TSTF of the concern, a Request for Additional Information (RAI) was transmitted to Exelon Generation Company regarding the license amendment request for the R.E. Ginna station. The TSTF informed the NRC that our response would be deferred until the R. E. Ginna RAI was resolved. The NRC approval of the R.E. Ginna license amendment, referenced in the attachment, was issued on February 9, 2017. The TSTF response to the NRC staff concern is attached.

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

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Attachment

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**TSTF Response to NRC April 27, 2016 Issuance of Draft TSTF-490, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec"**

NRC Concern

Traveler TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS [reactor coolant system] Specific Activity Tech Spec [Technical Specification]," was approved on March 8, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML070250176) (72 FR 12838 dated March 19, 2007). Traveler TSTF-490 replaces the RCS gross specific activity limit for pressurized water reactors (PWRs) with an RCS noble gas activity limit. The noble gas activity limit is based on dose equivalent Xenon-133 (DEX), instead of the indicator known as E bar.

During the NRC's review of license amendments to adopt the subject Traveler, the NRC staff has identified a need for additional information. The NRC staff's concern relates to increasing the completion time for DEX, as stated below.

TSTF-490, in part, deleted Condition C requiring gross specific activity of the coolant less than or equal to  $100/\bar{E}$   $\mu\text{Ci}/\text{gm}$  and replace it with DEX not within limit. Prior to the TSTF-490 approval, the Standard TS (STS) Limiting Condition for Operation (LCO) 3.4.16, when the gross specific activity of the coolant is greater than  $100/\bar{E}$   $\mu\text{Ci}/\text{gm}$ , the required action was to take immediate action to begin shutdown of the reactor (be in Mode 3 with  $T_{\text{avg}}$  less than  $500^{\circ}\text{F}$ ) within 6 hours. TSTF-490 allows 48 hours to restore DEX within limits. If DEX cannot be restored TSTF-490 allows 6 hours to be in Mode 3 and 36 hours to be in Mode 5. TSTF-490, Revision 0, provided the following justification for this change:

The Completion Time for revised TS 3.4.16 Required Action B.1 will require restoration of Dose Equivalent Xe-133 to within limit in 48 hours. This is consistent with the Completion Time for current Required Action A.2 for Dose Equivalent I-131. The Completion Time of 48 hours for revised Required Action B.1 is acceptable since it is expected that, if there were a noble gas spike, the normal coolant noble gas concentration would be restored within this time period. Also, there is a low probability of an accident occurring during this time period.

While it is a correct statement that the proposed change makes the Completion Times of Required Action A.2 and B.1 in the PWR STS consistent, it is not clear to the NRC staff why the Completion Times should be consistent. The plant Conditions for these Required Actions are different. TS Required Action A.2 is required when the plant is in a condition analyzed in the design basis accident (DBA) analyses (reactor coolant dose equivalent I-131 is between 1 and 60  $\mu\text{Ci}/\text{gm}$ ). The new TS Required Action B.1 is required when the plant is in a condition not analyzed in the DBA analyses (DEX is greater than 280  $\mu\text{Ci}/\text{gm}$ ).

Typically, the Required Action for a condition not analyzed requires the plant to take immediate actions to begin shutdown of the plant. This action is consistent with the current required action for exceeding the gross specific activity of the reactor coolant, which requires the plant be in Mode 3 with  $T_{\text{avg}}$  less than  $500^{\circ}\text{F}$  within 6 hours. The change does not take immediate actions to begin shutdown of the plant, but allows 48 hours before the plant is required to begin shutting down. Therefore, additional justification for the change to increase the Completion Time of

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Required Action B.1 to 48 hours and why it is acceptable to be in an unanalyzed condition for 48 hours is needed.

The issue identified above should be included with the other previous requests for additional information (RAIs) identified for TSTF-490. When requesting to adopt this Traveler it is suggested that licensees include the additional justification for the issue stated above, or maintain their current completion time associated with current Condition C (6 hours).

TSTF Response

The justification for TSTF-490 states:

The Completion Time for revised TS 3.4.16 Required Action B.1 will require restoration of Dose Equivalent Xe-133 to within limit in 48 hours. This is consistent with the Completion Time for current Required Action A.2 for Dose Equivalent I-131. The Completion Time of 48 hours for revised Required Action B.1 is acceptable since it is expected that, if there were a noble gas spike, the normal coolant noble gas concentration would be restored within this time period. Also, there is a low probability of an accident occurring during this time period.

The NRC's Safety Evaluation for TSTF-490, Revision 0, published in the Federal Register on March 15, 2007 (72FR12217) evaluated the DEX Completion Time as:

The Completion Time for revised TS 3.4.16 Required Action B.1 will require restoration of DEX to within limit in 48 hours. This is consistent with the Completion Time for current Required Action A.2 for DEI [Dose Equivalent Iodine]. The radiological consequences for the [Steam Generator Tube Rupture] SGTR and the [Main Steam Line Break] MSLB accidents demonstrate that the calculated thyroid doses are generally a greater percentage of the applicable acceptance criteria than the calculated whole body doses. It then follows that the Completion Time for noble gas activity being out of specification in the revised Required Action B.1 should be at least as great as the Completion Time for iodine specific activity being out of specification in current Required Action A.2. Therefore, the Completion Time of 48 hours for revised Required Action B.1 is acceptable from a radiological dose perspective.

In the April 27, 2016 letter, the NRC staff disagreed with the previous Safety Evaluation for the following reasons:

1. "The plant Conditions for these Required Actions are different. TS Required Action A.2 is required when the plant is in a condition analyzed in the design basis accident (DBA) analyses (reactor coolant dose equivalent I-131 is between 1 and 60  $\mu\text{Ci/gm}$ ). The new TS Required Action B.1 is required when the plant is in a condition not analyzed in the DBA analyses (DEX is greater than 280  $\mu\text{Ci/gm}$ )."

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Response

The TSTF-490 justification and the NRC's Safety Evaluation for TSTF-490 state that the radiological consequences for the SGTR and the MSLB accidents demonstrate that the calculated thyroid doses are generally a greater percentage of the applicable acceptance criteria than the calculated whole body doses. Thyroid doses are primarily a function of DEI, while the noble gases represented by DEX are significant contributors to whole body dose.

The traveler justification is supported by the following evaluation. The MSLB and SGTR accidents are the accidents of concern with regard to DEI and DEX because the accident source term is derived only from the coolant activity. An analysis performed by a licensee to support adoption of TSTF-490<sup>1</sup> determined that for MSLB and SGTR accidents, the dose contribution of DEX is no more than approximately 10% of the total dose. In other words, exceeding the DEI limit carries about nine times more dose impact than exceeding the DEX limit. This result is consistent with the statements in the TSTF-490 justification and the NRC TSTF-490 safety evaluation. While plant-specific evaluations may result in variation on this result, the underlying physical characteristics would not result in DEX becoming a more significant dose contributor than DEI. Limited operation above the DEX limit does not result in increased risk to individuals located in the control room and offsite because coolant noble gas activity contributes only a fraction of the dose consequences resulting from design basis accidents. Therefore, it is reasonable that the Completion Time when the DEX limit is exceeded should be the same as or longer than the Completion Time when the DEI limit is exceeded. TSTF-490 proposes the same Completion Time for both conditions.

The TSTF agrees that Action A is limited to a Dose Equivalent Iodine (DEI) of 60  $\mu\text{Ci/gm}$ , while the DEX Action does not contain an upper limit. However, the activity represented by DEI and DEX are created by the same physical condition (e.g., fuel failures), such that an increase in DEX will also result an increase in DEI, thereby imposing a practical limit on DEX. (For analyses of accidents that also include fuel damage, the contribution from the initial activity in the primary coolant is insignificant.) Therefore, it is not necessary to impose an upper limit on DEX, similar to that for DEI, to justify a similar Completion Time.

2. "Typically, the Required Action for a condition not analyzed requires the plant to take immediate actions to begin shutdown of the plant. This action is consistent with the current required action for exceeding the gross specific activity of the reactor coolant, which requires the plant be in Mode 3 with  $T_{\text{avg}}$  less than 500°F within 6 hours. The change does not take immediate actions to begin shutdown of the plant, but allows 48 hours before the plant is required to begin shutting down. Therefore, additional justification for the change to increase the Completion Time of Required Action B.1 to 48 hours and why it is acceptable to be in an unanalyzed condition for 48 hours is needed."

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<sup>1</sup> James Barstow (Exelon Generation) to U.S. NRC, "Response to Request for Additional Information for the Review of TSTF-490, 'Deletion of E-Bar Definition and Revision to RCS Specific Activity Tech Spec'," dated April 14, 2016 (NRC ADAMS Accession No. ML16105A243).

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Response

The regulations and the TS do not specify that Required Actions for an unanalyzed condition should require an immediate shutdown of the plant. 10 CFR 50.36(c)(2) states, "When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met." As stated in 10 CFR 50.36(b), the Limiting Conditions for Operation (LCOs) are based on the analyses and evaluation included in the safety analysis report, and all TS Actions represent a condition outside the accident analysis. However, most Actions do not require an immediate plant shutdown. The TS Actions for mechanical systems and components when the accident analysis assumptions are not met, such as single failure protection, almost always provide time to restore the system to compliance with the LCO. Similarly, the TS requirements for accident analysis initial parameters, such as hot channel factors, temperature coefficients, and power distribution limits, contain Required Actions for those parameters exceeding the values assumed in the accident analysis, and most do not require an immediate plant shutdown. Therefore, it is consistent with the existing TS and with 10 CFR 50.36 for an Action to provide a limited period to restore compliance with the LCO when outside the accident analysis assumptions.

The large majority of TS Completion Times are not based on analysis, but on the similarity of plant conditions. Completion Times are based on choosing a standard time (i.e., 1 hour, 12 hours, 24 hours, 48 hours, 36 hours, 72 hours, 7 days, 30 days) that is longer or shorter than a previously established Completion Time using engineering judgement to compare the relative risk of the conditions. In addition, the Completion Time is based on both the consequences of an accident while in the Action and the likelihood of the accident occurring during the Completion Time. The likelihood of the MSLB and SGTR accidents is the same for DEX and DEI, while the consequences (dose) from DEX is substantially smaller than for DEI. Therefore, a Completion Time of 48 hours for DEX not within limit is appropriate based on the similar condition of DEI not within limit, the reduced consequences from DEX not being within limit as compared to DEI, and the same likelihood of occurrence of the applicable accidents when DEX and DEI are not within limit.

Conclusion

The use of a 48 hour Completion Time when DEX is not within limit is acceptable, consistent with the justification provided in TSTF-490 and the evaluation provided in the NRC's safety evaluation for TSTF-490.