Attachment

Response to NRC Request for Additional Information Regarding TSTF-553, Revision 0, "Add Action For Two Inoperable CREATCS Trains"

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

By letter dated October 31, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15304A002), the Technical Specifications Task Force (TSTF) submitted to the U.S. Nuclear Regulatory Commission (NRC) for review Traveler TSTF-553, Revision 0, "Add Action for Two Inoperable CREATCS [Control Room Emergency Air Temperature Control System] Trains."

TSTF-553 proposes to revise the current Technical Specification (TS) 3.7.11, to modify the TS Actions for two inoperable CREATCS trains. The revised Action provides 24 hours to restore a CREATCS train to operable status, provided the control room area temperature is maintained below a plant-specific limit. TSTF-553 is applicable to all Babcock & Wilcox and Westinghouse plants (NUREG-1430 and NUREG-1431).

Question #1 is from the Probabilistic Risk Assessment Operations and Human Factors Branch (APHB). Questions #2 through #5 are from the Containment and Ventilation Branch (SCVB).

RAI #1:

Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the Code of Federal Regulations (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities," Criterion 19 – Control room, states, in part: "A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe shutdown condition under accident conditions, including loss-of-coolant accidents."

NUREG-0700, "Human-System Interface Design Review Guidelines," Revision 2, Section 12, "Workplace Design," Subsection 12.1.2.1, "Temperature and Humidity," Guideline 12.1.2.1-1, "Comfort Zone," states: "The climate control system should maintain temperatures of 68-75°F in winter and 73-79°F in summer and relative humidity levels between 30% and 60%." Further, the additional information accompanying this guideline, states, in part: "The temperature ranges given are based on the ASHRAE [American Society of Heating, Refrigerating and Air-Conditioning Engineers] 55-1992."

While the above guidance addresses the temperature comfort zone in the control room, it does consider maximum allowable temperatures and associated stay times (action times), to ensure control room habitability. Related guidance for heat stress exposure is found in NUREG-0700, Revision 2, Section 12, Subsection 12.2.5.1, "Heat," Guideline 12.2.5.1-1, "Heat Stress," which states: "The level of physical activity and required protective clothing, as well as temperature and humidity, should be considered when assessing the danger of heat exposure. Further, the additional information accompanying this guideline, states: "Important considerations are the amount of metabolic heat being generated by the worker and the restriction of evaporative heat loss associated with protective clothing. Workers' abilities to withstand heat will also differ based on their physical conditioning and degree of acclimatization." While this guidance is provided for Local Control Stations and not Control Rooms, it addresses the effects of heat stress for workers with low metabolism (which is characterized as light work, such as actively

monitoring spatially distributed equipment, walking, retrieving procedures or manuals, etc.) and work clothes. Table 12.7, "Stay times for different WBGTs [Wet-bulb globe temperatures]," illustrates that, for example, the stay time for WBGT of 93°F for an individual in work clothes with low metabolism is limited to 3 to 8 hours, whereas the stay time for WBGT of 97°F for the same individual would be limited to 2 to 4 hours.

With both CREATCS trains being inoperable, the effects of heat stress due to the rising temperature, under some circumstances, may impede the operators' ability to take actions required to safely operate the nuclear power unit.

TSTF-553, Revision 0, Section 2.4, "Description of the Proposed Change," states, in part: "The proposed Required Actions require verification that control room temperature is less than a plant-specific limit every 4 hours and restoration of one CREATCS train to operable status within 24 hours." Further, Section 3, "Technical Evaluation," states, in part: "The four-hour monitoring frequency of control room area temperature is adequate given the indications available in the control room, the time required for a significant increase in control room air temperature, and NRC acceptance of this interval in similar Technical Specifications for other plant designs."

Provide additional information to clarify why the proposed temperature monitoring frequency is set at 4 hours, and does not vary with the plant-specific maximum temperature limit. In the response, identify what industry standard(s) or guidance (such as, for example, EPRI TR-109445, "Heat Stress Management Program for Power Plants"), or other data were used in determining the acceptable stay times, based on varying temperature and humidity levels.

TSTF Response

As discussed in Section 2.3 of the traveler justification, the four-hour frequency for verifying the control room temperature while in the Condition was selected based on a similar Required Action and testing frequency in the Boiling Water Reactor (BWR)/4 and BWR/6 improved Standard Technical Specifications (NUREG-1433 and NUREG-1434). However, given the importance of ensuring that control room temperature remains below the limit, TSTF-553 is revised to require verification that the control room temperature is below the limit once per hour.

The verification frequency of 1 hour does not allow temperature to exceed the limit between performances. As stated in the LCO 3.0.2 Bases, "An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the unit is not within the LCO Applicability." There are many Required Actions in the ISTS that verify a condition is met with Completion Times stated as "Once per...". For example, TS 3.6.3, "Containment Isolation Valves," requires isolation of a penetration flow path when a containment valve in the flow path is inoperable. There are Required Actions to verify the penetration flow path is isolated once per 31 days. These Required Actions state a condition that must be maintained at all times while in the condition, not only once per 31 days.

The one-hour monitoring frequency of control room area temperature is adequate given the indications available in the control room and the time required for a significant increase in

control room air temperature. When a plant is in a Required Action that can result in a plant shutdown, operator and plant management attention is on resolving the condition and satisfying the Required Actions to prevent a shutdown. Control room area temperature data is available from the control room. Attachment 2 of the model application in TSTF-553, "Justification of the Control Room Area Temperature Limit," is revised to require licensees to include a description of the control room area temperature monitoring instruments and how an operator would be aware that control room temperature is approaching the plant-specific limit. Requiring the temperature to be recorded (to document performance of the Required Action) more frequently than once per hour would unnecessarily distract the operator from more safety significant activities.

Attachment 2 of the model application contains a Reviewer's Note that provides guidance on the licensee justification for the plant-specific temperature limit in Required Action C.1. The Reviewer's Note is revised to state that the justification should reference any industry standards or guidance, or other data used in determining the control room temperature limit and any limitations on operator stay times.

Section 3 of the justification is revised to incorporate this information.

RAI #2

Page 2 of TSTF-553, Revision 0, second paragraph states:

> *Depending on the plant design, the CREATCS and the CREVS [Control Room Emergency Ventilation System] or CREFS [Control Room Emergency Filtration System] may share components, such as ductwork, dampers, or doors. Inoperability of the CREATCS or of the CREVS or CREFS would not affect the operability of the other system unless a shared component, such as ductwork, is affected.*

The last sentence, although not incorrect, is limited to passive components only. Depending on the system configuration, many plants are designed to have flow in series through active components such as fans in CREVS and CREATCS. In such cases, there is a potential for an inoperable CREATCS fan to render the CREVS also inoperable. On the other hand, an inoperable chiller or a chilled water pump in CREATCS may not have an impact on CREVS operability. In this regard, the NRC staff requests additional discussion in the Traveler as to how these situations regarding CREVS operability would be implemented/handled in the TS, including possible entry into limiting condition for operation (LCO) 3.7.10.F.

TSTF Response

As acknowledged in the question, the ventilation (CREVS or CREFS) and cooling (CREATCS) functions may share components but are governed by separate Limiting Conditions for Operation (LCOs) in the improved Standard Technical Specifications (ISTS).

The ISTS LCO Bases for the CREATCS state:

> The CREATCS is considered OPERABLE when the individual components that are necessary to maintain control room temperature are OPERABLE in both trains. These components include the cooling coils, water cooled condensing units, and associated temperature control instrumentation. In addition, the CREATCS must be OPERABLE to the extent that air circulation can be maintained.

The ISTS LCO Bases for the CREVS (and the similar CREFS Bases), state:

> Each CREVS train is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A CREVS train is considered OPERABLE when the associated:
>
> a. Fan is OPERABLE,
>
> b. HEPA filter and charcoal absorber are not excessively restricting flow, and are capable of performing their filtration functions, and
>
> c. Heater, demister, ductwork, valves, and dampers are OPERABLE, and air circulation can be maintained.

Should a component required by both the CREVS/CREFS and the CREATCS be unable to perform its required function, both LCOs would be declared not met and all applicable Actions would be followed. If the inoperability affected both trains of CREATCS and both trains of CREVS/CREFS, then proposed 3.7.11 Condition C would apply, as well as 3.7.10 Condition B, E, or F. TS 3.7.10, Condition F requires immediately entering LCO 3.0.3. As stated in Section 2.1 of the justification, the proposed change does not alter the requirements on the CREVS or CREFS.

Section 3 of the justification is revised to incorporate this information.

RAI #3

Page 3 of TSTF-553, Revision 0, and first bullet under the paragraph starting "The requirements are not consistent . . ." states:

> *NUREG-1432, the ISTS [improved standard technical specifications] for Combustion Engineering plants, TS 3.7.11, provides 24 hours to restore one of two inoperable control room cooling trains provided mitigating actions are implemented and the Reactor Coolant System (RCS) Specific Activity TS Limiting Condition for Operation (LCO) is met. This allowance was approved by the NRC on May 30, 2013 as TSTF-426, Revision 5, "Revise or Add Actions to Preclude Entry into LCO 3.0.3 - RITSTF Initiatives 6b & 6c" [. . .]. To date, this traveler has been adopted by four of the eight Combustion Engineering plants.*

The referenced TS 3.7.11 is incorrect for control room cooling trains. The information in TS 3.7.12 applies to control room cooling trains. The reference to RCS Specific Activity TS LCO is also incorrect. It applies to Control Room Emergency Air Cleanup System (TS 3.7.11), not the control room cooling trains. Revise the references and the discussion to convey its intended purpose and use in TSTF-553.

TSTF Response

The justification has been revised to state:

- NUREG-1432, the ISTS for Combustion Engineering plants, TS 3.7.12, provides 24 hours to restore one of two inoperable control room cooling trains. This allowance was approved by the NRC on May 30, 2013 as TSTF-426, Revision 5, "Revise or Add Actions to Preclude Entry into LCO 3.0.3 - RITSTF Initiatives 6b & 6c" (Reference 3) To date, this traveler has been adopted by four of the eight Combustion Engineering plants.

RAI #4

Section 3, Technical Evaluation, second paragraph, last sentences states:

> *This evaluation may credit compensatory actions, such as use of normal ventilation systems, opening of cabinet doors, use of fans or ice vests, and opening control room doors or ventilation paths. If the control room envelope boundary is breached in order to provide cooling, the Actions of TS 3.7.10 (CREVS/CREFS) would also apply. This evaluation is performed for normal operating conditions including the availability of normal electrical power based on the small likelihood of an event requiring the CREATCS during the 24 hour Completion Time.*

In addition to what was stated in RAI #2, this is one area of the interdependency between CREATCS and CREVS. It brings out a conflict between the proposed compensatory actions under the TS for CREATCS and the existing mitigating actions under TS 3.7.10 for CREVS/CREFS. Opening the control room doors would compromise the control room boundary thus placing the plant in TS 3.7.10 Action Statement B.1, requiring immediate initiation of action to implement mitigating actions. Opening control room doors intentionally, in effect, could also render both trains of CREVS/CREFS to be inoperable due to inoperable control room boundary in MODE 1, 2, 3, or 4 during the 24 hours, along with both trains of CREATCS. Why is this acceptable? What would then be the immediate mitigating actions that can be initiated under TS 3.7.10 Action Statement B.1? The Traveler should address this issue in more detail, and also provide guidance to licensees to address this condition in their plant-specific submittals.

TSTF Response

Opening the control room doors for the purposes of maintaining control room temperature is only one of many possible actions that could be taken to maintain control room temperature if

two CREATCS trains are inoperable. As noted in the justification, many plants utilize a normal cooling system and the CREATCS is a standby system. For such designs, no compensatory measures would be needed to maintain control room temperature. Further, there are many reasons which could render a CREATCS train inoperable, such as a lack of normal or emergency power when the redundant train is inoperable, which would not prevent its use for normal cooling.

The proposed change to TS 3.7.11 does not alter the requirements in TS 3.7.10. Should a licensee chose to open the control room boundary to maintain temperature, the existing TS 3.7.10, CREVS/CREFS, allows operation with an inoperable boundary for 24 hours prior to verifying that the mitigating actions are adequate to protect the control room occupants, and for 90 days thereafter. The allowance to operate for 24 hours with an inoperable barrier was added to TS 3.7.10 in 2001 by NRC-approved TSTF-287, "Ventilation System Envelope Allowed Outage Time.". The allowance to operate 90 days with an inoperable barrier provided immediate mitigating actions are taken and demonstration within 24 hours that the control room occupants are protected was added by TSTF-448, "Control Room Habitability," which was approved by the NRC in 2007. Therefore, the NRC has previously determined that it is acceptable for a licensee to intentionally open the control room boundary for up to 24 hours, including intentional opening of the control room doors. The proposed change does not alter these existing requirements.

Should a licensee decide to open the control room boundary to maintain control room temperature, TS 3.7.10, Condition B, may apply depending on the size of the opening and the potential inleakage of unfiltered outside air. Required Action B.1 requires immediate action to implement mitigating actions. As stated in the Required Action B.1 Bases, these mitigating actions should be preplanned for implementation upon entry into the condition, regardless of whether entry is intentional or unintentional. The use of mitigating actions is discussed in Regulatory Guide 1.196, "Control Room Habitability at Light-Water Nuclear Power Reactors," Section C.2.7.3, which endorses, with exceptions, NEI 99-03, "Control Room Habitability Assessment," Section 8.4 and Appendix F. These mitigating actions are discussed in the Bases of SR 3.7.10.4, which requires verification of the integrity of the control room boundary by testing for unfiltered air inleakage. Therefore, sufficient guidance currently exists in TS 3.7.10 on the use of mitigating actions when the control room boundary is inoperable. These existing provisions are not affected by the proposed change.

RAI #5

The last paragraph in "Attachment 2 – Justification of the Control Room Area Temperature Limit" states:

> *This evaluation is performed for normal operating conditions including the availability of normal electrical power based on the small likelihood of an event requiring the CREATCS during the 24 hour Completion Time.*

This statement made here and other places in the Traveler, also needs to consider control room habitability, not only from temperature view point but also from other aspects applicable to the plant such as hazardous chemicals, smoke, etc. The CREFS plays a larger role in protecting the

control room operators under such conditions. How does temperature mitigating actions such as opening control room doors impact the readiness of CREFS to protect control room habitability from other aspects applicable?

TSTF Response

Protecting control room operators from radiation, hazardous chemicals, and smoke is performed by the CREFS/CREVS, as required by TS 3.7.10. As discussed in response to RAI #4, opening the control room doors for the purposes of maintaining control room temperature is only one of many possible actions that could be taken to maintain control room temperature if two CREATCS trains are inoperable. Should a licensee chose to open the control room boundary to maintain temperature, the existing TS 3.7.10, CREVS/CREFS, allows operation with an inoperable boundary for 24 hours prior to verifying that the mitigating actions are adequate to protect the control room occupants. The proposed change does not alter these existing requirements.