

## Industry/TSTF Standard Technical Specification Change Traveler

### Revise SR frequency for Minimum Temperature for Criticality

Priority/Classification 3) Improve Specifications

NUREGs Affected:  1430  1431  1432  1433  1434

#### Description:

The frequency for SR 3.4.2.1 has been clarified such that initial performance does not result in non-compliance with the LCO. The Bases have been rewritten to clarify the application of the note that modifies the frequency of the SR. The NUREG-1432 Applicability is revised to match the other PWR specifications.

#### Justification:

The PWR ITS specification, "RCS Minimum Temperature for Criticality," is designed to prevent criticality outside of the normal operating regime. There are no safety analyses that dictate the minimum temperature for criticality, but most low power accident analyses assume a specific starting temperature.

The presentation of this requirement varies between the PWR NUREGs, but the intent is the same. It can be stated as, "When RCS temperature is below a certain threshold temperature in Modes 1 and 2, verify that RCS temperature is not below the minimum temperature for criticality every 30 minutes."

TSTF-27 revises this presentation. The approach presented can be paraphrased as, "When in Modes 1 and 2, verify that the RCS temperature is above the minimum temperature for criticality every 12 hours."

On September 18, 1996, the NRC rejected the proposed change. They stated, "Although the proposed change is more restrictive, the staff believes that the purpose of the surveillance is for conditions approaching the minimum temperature for criticality, rather than to make the surveillance more routine. Thus, consistency and simplicity are not as important in this case, as the scope and purpose of the SR." The NRC's concerns are consistent with the Bases for the Surveillance.

Notwithstanding the NRC's concerns, the TSTF believes that the proposed presentation is still preferable to the existing requirements for two reasons, described below.

The NRC's objection is based on the assumption that RCS temperature is only monitored when required to meet a Surveillance. This assumption is incorrect. During the approach to criticality, among of the most watched indicators in the control room are the RCS temperature instruments. RCS temperature is watched constantly because RCP heat addition and condenser bypass flow are being carefully balanced to maintain a steady RCS temperature. Following criticality, RCS temperature is watched constantly as the turbine is latched and put on automatic temperature control. There are indications in the control room on Tavg / Tref deviation and on low temperature to alert the operator if temperature is deviating from program. The frequency of the SR only specifies how often temperature is logged, not how often it is watched. Therefore, the issue isn't whether or not the safety analysis assumptions are being protected, but how often RCS temperature is recorded in an Operator's log. Therefore, this debate is about presentation and logging, not safety.

The problem with the current presentation is that it can lead to inadvertently violating the SR frequency with no effect on safety. The 30 minute SR Frequency "clock" continues even when RCS temperature is above the SR or Applicability threshold temperature. Therefore, if temperature drops below the threshold value after more than 37 minutes (30 minutes + 25%) from the last time RCS temperature was logged (for example, when latching the turbine), the SR frequency has been violated. If temperature has unexpectedly decreased, the Operator's attention should be on restoring temperature, not logging a value to met a Surveillance. The Operator is faced with making a decision of whether to focus his attention on the plant or on an administrative requirement. This is clearly adverse to safety. The other option is to perform the surveillance every 30 minutes until temperature is well above the threshold value (for example, 30% with the turbine latched) in order to ensure that the SR has been performed if temperature should drop. This is not a beneficial use of an Operator's time during the critical phases of a startup.

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The 12 hour fixed frequency proposed in TSTF-27 will ensure that Tavg is logged at least once per shift (in addition to strip chart recorders and computer logging of temperature).

The requirement is sufficiently stated in the LCO: when the reactor is critical, temperature must be above a certain value. This requirement will be monitored based on operating necessity and existing instrumentation whether or not it is specified in a Surveillance. Requiring that the value be logged based on conditional circumstances is poor human-factors design and diverts the Operator's attention from his duties without a compensating safety benefit.

Additional justification added with Revision 3: The 12 hour frequency is acceptable because the Surveillance is performed at least once per shift. In addition, the operators are sensitive to ensuring the temperature is greater than the minimum temperature for criticality as criticality is approached.

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**Revision History****OG Revision 0****Revision Status: Closed**

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Revision Proposed by: Ginna

Revision Description:  
Original Issue

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**Owners Group Review Information**

Date Originated by OG: 14-Nov-97

Owners Group Comments  
(No Comments)Owners Group Resolution: Approved Date: 14-Nov-95

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**TSTF Review Information**

TSTF Received Date: 02-Nov-95 Date Distributed for Review 02-Nov-95

OG Review Completed:  BWOG  WOG  CEOG  BWROGTSTF Comments:  
(No Comments)TSTF Resolution: Approved Date: 14-Nov-95

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**NRC Review Information**

NRC Received Date: 16-Nov-95 NRC Reviewer: M. Weston

NRC Comments:

2/20/96 - reviewer approved

3/4/96 package to C. Grimes to review

6/11/96 - C. Grimes comment: TSTF-27 to be referred to a Tech Br.

Final Resolution: Superseded by Revision

Final Resolution Date: 12-Jun-96

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**TSTF Revision 1****Revision Status: Closed**

Revision Proposed by: WOG

## Revision Description:

This revision replaced the justification in total. New justification: The surveillance of T-avg in Specification 3.4.2 (SR 3.4.2.1) is only required as T-avg approaches its limit. At normal operating temperatures there is no surveillance stated. The plant design incorporates monitoring of T-avg and automatic alarms as T-avg approaches its limit. Essentially, SR 3.4.2.1 requires increased monitoring during the time that the monitoring instrumentation would be in alarm (in fact, the WOG ISTS surveillance is explicitly not required unless the alarm is alarming.)

This type of alarm-response action is not typically implemented as TS required Surveillances. The typical ISTS surveillance would be to periodically (e.g., shiftly) monitor/check the parameter in question (and indirectly affirm appropriate state of the alarm), and allow and allow plant specific alarm response procedures to serve to increase the frequency of monitoring as the parameter approaches its limit.

Therefore, for consistency of presentation and to provide a more complete surveillance of T-avg, the frequency verification is revised to every "12 hours". This imposes a more restrictive surveillance in that a positive verification is now required, rather than relying solely on annunciation but also relocated the specific details associated with the operator's response to an alarm condition. This detail is not required to be in the ISTS to provide adequate protection of the public health and safety, since the ISTS still retains the requirement of monitor and limit T-avg.

**TSTF Review Information**

TSTF Received Date: 12-Apr-96

Date Distributed for Review 12-Apr-96

OG Review Completed:  BWO  WOG  CEOG  BWROG

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 28-May-96

**NRC Review Information**

NRC Received Date: 12-Jun-96

NRC Reviewer: M. Weston

NRC Comments:

9/18/96 - NRC REJECTS: Although the proposed change is more restrictive, the staff believes that the purpose of the surveillance is for conditions approaching the minimum temperature for criticality, rather than to make the surveillance more routine. Thus, consistency and simplicity are not as important in this case, as the scope and purpose of the SR.

10/30/96 - TSTF to pursue.

Final Resolution: Superseded by Revision

Final Resolution Date: 07-Apr-97

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**TSTF Revision 2****Revision Status: Closed**

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Revision Proposed by: CEOG

Revision Description:

The PWR ITS specification, "RCS Minimum Temperature for Criticality," is designed to prevent criticality outside of the normal operating regime. There are no safety analyses that dictate the minimum temperature for criticality, but most low power accident analyses assume a specific starting temperature.

The presentation of this requirement varies between the PWR NUREGs, but the intent is the same. It can be stated as, "When RCS temperature is below a certain threshold temperature in Modes 1 and 2, verify that RCS temperature is not below the minimum temperature for criticality every 30 minutes."

TSTF-27 revises this presentation. The approach presented can be paraphrased as, "When in Modes 1 and 2, verify that the RCS temperature is above the minimum temperature for criticality every 12 hours."

On September 18, 1996, the NRC rejected the proposed change. They stated, "Although the proposed change is more restrictive, the staff believes that the purpose of the surveillance is for conditions approaching the minimum temperature for criticality, rather than to make the surveillance more routine. Thus, consistency and simplicity are not as important in this case, as the scope and purpose of the SR." The NRC's concerns are consistent with the Bases for the Surveillance.

Notwithstanding the NRC's concerns, the TSTF believes that the proposed presentation is still preferable to the existing requirements for two reasons, described below.

The NRC's objection is based on the assumption that RCS temperature is only monitored when required to meet a Surveillance. This assumption is incorrect. During the approach to criticality, among of the most watched indicators in the control room are the RCS temperature instruments. RCS temperature is watched constantly because RCP heat addition and condenser bypass flow are being carefully balanced to maintain a steady RCS temperature. Following criticality, RCS temperature is watched constantly as the turbine is latched and put on automatic temperature control. There are indications in the control room on Tavg / Tref deviation and on low temperature to alert the operator if temperature is deviating from program. The frequency of the SR only specifies how often temperature is logged, not how often it is watched. Therefore, the issue isn't whether or not the safety analysis assumptions are being protected, but how often RCS temperature is recorded in an Operator's log. Therefore, this debate is about presentation and logging, not safety.

The problem with the current presentation is that it can lead to inadvertently violating the SR frequency with no effect on safety. The 30 minute SR Frequency "clock" continues even when RCS temperature is above the SR or Applicability threshold temperature. Therefore, if temperature drops below the threshold value after more than 37 minutes (30 minutes + 25%) from the last time RCS temperature was logged (for example, when latching the turbine), the SR frequency has been violated. If temperature has unexpectedly decreased, the Operator's attention should be on restoring temperature, not logging a value to met a Surveillance. The Operator is faced with making a decision of whether to focus his attention on the plant or on an administrative requirement. This is clearly adverse to safety. The other option is to perform the surveillance every 30 minutes until temperature is well above the threshold value (for example, 30% with the turbine latched) in order to ensure that the SR has been performed if temperature should drop. This is not a beneficial use of an Operator's time during the critical phases of a startup.

The 12 hour fixed frequency proposed in TSTF-27 will ensure that Tavg is logged at least once per shift (in addition to strip chart recorders and computer logging of temperature).

The requirement is sufficiently stated in the LCO: when the reactor is critical, temperature must be above a certain value. This requirement will be monitored based on operating necessity and existing instrumentation whether or not it is specified in a Surveillance. Requiring that the value be logged based

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on conditional circumstances is poor human-factors design and diverts the Operator's attention from his duties without a compensating safety benefit.

### TSTF Review Information

TSTF Received Date: 30-Oct-96 Date Distributed for Review 03-Feb-97

OG Review Completed:  BWOG  WOG  CEOG  BWROG

TSTF Comments:  
(No Comments)

TSTF Resolution: Approved Date: 21-Mar-97

### NRC Review Information

NRC Received Date: 07-Apr-97 NRC Reviewer: M. Weston

NRC Comments:

4/10/97 - Forwarded to reviewer.

8/28/97 - TSTF requested meeting with TSB to resolve obstacles to disposition.

10/2/97 - Reviewer forwarded package to SRXB for review.

Final Resolution: Superseded by Revision

Final Resolution Date: 02-Oct-97

### TSTF Revision 3

Revision Status: Active

Next Action:

Revision Proposed by: TSTF

Revision Description:

The NRC expressed concern regarding the approach to criticality and the revised SR. The TSTF agreed to modify the Bases of the SR to state that operators must be sensitive to RCS temperature when approaching criticality to ensure that RCS temperature is greater than the minimum temperature for criticality. This approach was discussed and accepted by L. Kopp of NRC on 1/14/98.

### TSTF Review Information

TSTF Received Date: 14-Jan-98 Date Distributed for Review 15-Jan-98

OG Review Completed:  BWOG  WOG  CEOG  BWROG

TSTF Comments:  
(No Comments)

TSTF Resolution: Approved Date: 05-Feb-98

### NRC Review Information

NRC Received Date: 20-Feb-98 NRC Reviewer:

NRC Comments:  
(No Comments)

Final Resolution: NRC Approves

Final Resolution Date: 17-Apr-98

### Incorporation Into the NUREGs

File to BBS/LAN Date:

TSTF Informed Date:

TSTF Approved Date:

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NUREG Rev Incorporated:

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**Affected Technical Specifications**

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SR 3.4.2.1                    RCS Minimum Temperature for Criticality

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SR 3.4.2.1 Bases            RCS Minimum Temperature for Criticality

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Appl. 3.4.2                    RCS Minimum Temperature for Criticality                    NUREG(s)- 1432 Only

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Appl. 3.4.2 Bases            RCS Minimum Temperature for Criticality                    NUREG(s)- 1432 Only

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INSERT 1 (B&W)

RCS loop average temperature is required to be verified at or above 525°F every 12 hours. The SR to verify RCS loop average temperatures every 12 hours takes into account indications and alarms that are continuously available to the operator in the control room and is consistent with other routine Surveillances which are typically performed once per shift. In addition, operators are trained to be sensitive to RCS temperature during approach to criticality and will ensure that the minimum temperature for criticality is met as criticality is approached.

INSERT 2 (Westinghouse)

RCS loop average temperature is required to be verified at or above [541]°F every 12 hours. The SR to verify RCS loop average temperatures every 12 hours takes into account indications and alarms that are continuously available to the operator in the control room and is consistent with other routine Surveillances which are typically performed once per shift. In addition, operators are trained to be sensitive to RCS temperature during approach to criticality and will ensure that the minimum temperature for criticality is met as criticality is approached.

INSERT 3 (CE)

RCS loop average temperature is required to be verified at or above [520]°F every 12 hours. The SR to verify RCS loop average temperatures every 12 hours takes into account indications and alarms that are continuously available to the operator in the control room and is consistent with other routine Surveillances which are typically performed once per shift. In addition, operators are trained to be sensitive to RCS temperature during approach to criticality and will ensure that the minimum temperature for criticality is met as criticality is approached.

RCS Minimum Temperature for Criticality  
3.4.2

TSTF-27  
Rev 3

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.2 RCS Minimum Temperature for Criticality

LCO 3.4.2 Each RCS loop average temperature ( $T_{avg}$ ) shall be  $\geq 525^\circ\text{F}$ .

APPLICABILITY: MODE 1,  
MODE 2 with  $k_{eff} \geq 1.0$ .

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. $T_{avg}$ in one or more RCS loops not within limit.	A.1 Be in MODE 3.	30 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.2.1 Verify RCS $T_{avg}$ in each loop $\geq 525^\circ\text{F}$ .	<p>NOTE Only required if any RCS loop <math>T_{avg} &lt; 530^\circ\text{F}</math></p> <p>30 minutes thereafter</p>

12 hours

TSTF-27  
REV 3.

BASES (continued)

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**APPLICABILITY** The reactor has been designed and analyzed to be critical in MODES 1 and 2 only and in accordance with this Specification. Criticality is not permitted in any other MODE. Therefore, this LCO is applicable in MODE 1 and MODE 2 when  $k_{eff} \geq 1.0$ .

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**ACTIONS**

A.1

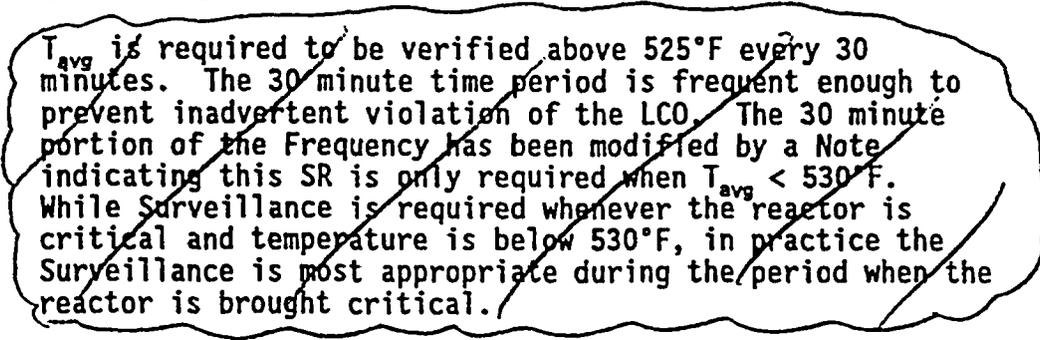
With  $T_{avg}$  below 525°F, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 in 30 minutes. Rapid reactor shutdown can be readily and practically achieved in a 30 minute period. The Completion Time reflects the ability to perform this Action and maintain the plant within the analyzed range. If  $T_{avg}$  can be restored within the 30 minute time period, shutdown is not required.

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**SURVEILLANCE REQUIREMENTS**

SR 3.4.2.1

~~$T_{avg}$  is required to be verified above 525°F every 30 minutes. The 30 minute time period is frequent enough to prevent inadvertent violation of the LCO. The 30 minute portion of the Frequency has been modified by a Note indicating this SR is only required when  $T_{avg} < 530^\circ\text{F}$ . While Surveillance is required whenever the reactor is critical and temperature is below 530°F, in practice the Surveillance is most appropriate during the period when the reactor is brought critical.~~



**REFERENCES**

1. FSAR, Chapter [15].
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Insert 1

TSTF-27  
REV 3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.2.1 Verify RCS $T_{avg}$ in each loop $\geq$ [541]°F.	<p><del>NOTE</del> Only required if [<math>T_{avg} - T_{ref}</math> deviation, low <math>T_{avg}</math>] alarm not reset and any RCS loop <math>T_{avg} &lt; [547]^\circ\text{F}</math></p> <p>30 minutes thereafter</p>

12 hours

TSTF-27

BASES

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APPLICABILITY (continued)      temperatures to fall below the temperature limit of this LCO.

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ACTIONS

A.1

If the parameters that are outside the limit cannot be restored, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 30 minutes. Rapid reactor shutdown can be readily and practically achieved within a 30 minute period. The allowed time is reasonable, based on operating experience, to reach MODE 3 in an orderly manner and without challenging plant systems.

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SURVEILLANCE REQUIREMENTS

SR 3.4.2.1

RCS loop average temperature is required to be verified at or above [541]°F every 30 minutes when [ $T_{avg} - T_{ref}$  deviation, low low  $T_{avg}$ ] alarm not reset and any RCS loop  $T_{avg} < [547]$ °F.

The Note modifies the SR. When any RCS loop average temperature is  $< [547]$ °F and the [ $T_{avg} - T_{ref}$  deviation, low low  $T_{avg}$ ] alarm is alarming, RCS loop average temperatures could fall below the LCO requirement without additional warning. The SR to verify RCS loop average temperatures every 30 minutes is frequent enough to prevent the inadvertent violation of the LCO.

REFERENCES

1. FSAR, Section [15.0.3].
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Insert 2

RCS Minimum Temperature for Criticality  
3.4.2

TSTF-27

REV 3

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.2 RCS Minimum Temperature for Criticality

LCO 3.4.2 Each RCS loop average temperature ( $T_{avg}$ ) shall be  $\geq$  [520°]F.

APPLICABILITY: MODE 1 with  $T_{avg}$  in one or more RCS loops  $<$  [535]°F,  
MODE 2 with  $T_{avg}$  in one or more RCS loops  $<$  [535]°F and  
 $K_{eff} \geq 1.0$ .

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. $T_{avg}$ in one or more RCS loops not within limit.	A.1 Be in MODE 3.	30 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.2.1 Verify RCS $T_{avg}$ in each loop $\geq$ [520]°F.	<del>30 minutes thereafter</del>

12 hours

TSTF-27  
REV 3

BASES

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LCO  
(continued)

The LCO is only applicable below [535]°F and provides a reasonable distance to the limit of [520]°F. This allows adequate time to trend its approach and take corrective actions prior to exceeding the limit.

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APPLICABILITY

The reactor has been designed and analyzed to be critical in MODES 1 and 2 only and in accordance with this specification. Criticality is not permitted in any other MODE. Therefore, this LCO is applicable in MODE 1, and MODE 2 when  $K_{eff} \geq 1.0$ . Coupled with the applicability definition for criticality is a temperature limit. Monitoring is required at or below a  $T_{avg}$  of [535]°F. The no load temperature of 544°F is maintained by the Steam Dump Control System.

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ACTIONS

A.1

If  $T_{avg}$  is below [520]°F, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 30 minutes. Rapid reactor shutdown can be readily and practically achieved within a 30 minute period. The allowed time reflects the ability to perform this action and to maintain the plant within the analyzed range.

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SURVEILLANCE  
REQUIREMENTS

SR 3.4.2.1

*Insert 3* →  ~~$T_{avg}$  is required to be verified  $\geq$  [520]°F every 30 minutes. The 30 minute time period is frequent enough to prevent inadvertent violation of the LCO. While the Surveillance is required whenever the reactor is critical and temperature is below [535]°F, in practice the Surveillance is most appropriate during the period when the reactor is brought critical:~~

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REFERENCES

1. FSAR, Section [15].
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