

June 3, 2005

TSTF-05-09

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

SUBJECT: TSTF-486, "Revise MTC Surveillance for Startup Test Activity Reduction (STAR) Program (WCAP-16011)"

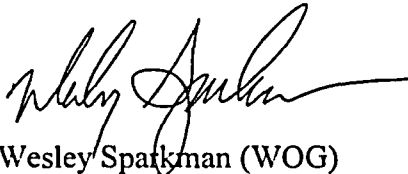
Dear Sir or Madam:

Enclosed for NRC review is TSTF-486, Revision 0, "Revise MTC Surveillance for Startup Test Activity Reduction (STAR) Program (WCAP-16011)." TSTF-486 is a proposed change to the Standard Technical Specifications (STS) NUREG-1432, and a candidate for adoption by licensees under the Consolidated Line Item Improvement Process (CLIIP).

TSTF-486 revises the Moderator Temperature Coefficient Surveillance Requirements to allow implementation of WCAP-16011-P-A, Rev. 0, "Startup Test Activity Reduction Program," dated February 2005.

Any NRC review fees associated with the review of TSTF-486, Revision 0, should be billed to the Westinghouse Owners Group.

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



Wesley Sparkman (WOG)



Brian Woods (WOG/CE)



Michael Crowthers (BWROG)



Paul Infanger (BWOG)

Enclosure

cc: Thomas H. Boyce, Technical Specifications Section, NRC

6014

11921 Rockville Pike, Suite 100, Rockville, MD 20852
Phone: 301-984-4400, Fax: 301-984-7600
Email: tstf@excelservices.com
Administered by EXCEL Services Corporation



Technical Specification Task Force
Improved Standard Technical Specifications Change Traveler

Revise MTC Surveillance for Startup Test Activity Reduction (STAR) Program (WCAP-16011)

NUREGs Affected: 1430 1431 1432 1433 1434

Classification: 1) Technical Change

Recommended for CLIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Not Exempt

Benefit: Shortens Outages

Industry Contact: Brian Woods, (949) 368-7621, woodsbl@songs.sce.com

1.0 Description

WCAP-16011-P, Rev. 0, "Startup Test Activity Reduction Program," proposed changes to pressurized water reactor reload startup testing to reduce testing operations and testing time while achieving the following objectives: (1) ensure that the core can be operated as designed, and (2) employ normal operating procedures in the startup evolution. The Topical Report was approved on January 14, 2005. One of the proposed changes relates to the verification of Moderator Temperature Coefficient (MTC) and requires a change to the Technical Specifications. The beginning of cycle verification of MTC is required prior to entering MODE 1. For fuel cycles that meet the applicability requirements given in WCAP-16011, the verification prior to entering MODE 1 may be made using the predicted MTC as adjusted for the actual boron concentration. When this approach is used, an additional measurement of MTC is required within 7 EFPD after reaching 40 EFPD. Implementation of the Startup Test Activity Reduction Program shortens the time required to perform startup testing, allowing a quicker return to power generation.

2.0 Proposed Change

The proposed change revises SR 3.1.3.1 in the digital and analog Combustion Engineering ISTS (NUREG-1432) by adding a second Frequency. This second Frequency requires verifying that MTC is within the upper limit each fuel cycle within 7 EFPD after reaching 40 EFPD of core burnup, but only when the MTC determined prior to entering MODE 1 is verified using predicted MTC as adjusted for actual RCS boron concentration. The Frequency is consistent with the existing MODE 1 MTC Surveillance Frequency. The Bases are revised to describe the new requirements and to clarify the analytical basis of the MTC utilizing the suggested changes in WCAP-16011-P.

Minor editorial changes are made to the Surveillances to properly reference the limit specified in the COLR.

3.0 Background

WCAP-16011-P, Rev. 0, "Startup Test Activity Reduction Program," proposed changes to pressurized water reactor reload startup testing. The Topical Report was approved on January 14, 2005. One of the changes proposed in the Topical Report and approved by the NRC requires a change to Specification 3.1.3, Moderator Temperature Coefficient.

02-Jun-05

4.0 Technical Analysis

WCAP-16011-P describes a method to reduce the time required for startup testing. To this end, the Topical Report (TR) justifies the elimination of certain startup testing requirements, including the control element assembly (CEA) worth and isothermal temperature coefficient (ITC) measurements at hot zero power (HZP). The TR also proposed to substitute the measured value of the moderator temperature coefficient (MTC) at HZP with an alternate MTC value consisting of the predicted (calculated) MTC as adjusted for the measured critical boron concentration (CBC) at HZP. An ITC measurement at intermediate to hot full power (HFP) is also added.

This method may be applied to cores that are well characterized by an existing database, using applicability requirements described in WCAP-16011.

5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

The TSTF has evaluated whether or not a significant hazards consideration is involved with the proposed generic change by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change allows the Moderator Temperature Coefficient (MTC) verification performed prior to entering MODE 1 after each refueling to consist of adjusting the predicted MTC for the measured reactor coolant system (RCS) boron concentration for those fuel cycles that fall within the applicability requirements described in WCAP-16011. When this modified verification is used, an additional measurement of MTC must be performed prior to exceeding 40 Effective Full Power Days (EFPDs) of core burnup. The MTC is not an initiator to any accident previously evaluated. Therefore, there is no significant increase in the probability of any accident previously evaluated. The MTC is an input to the accident analyses used to predict plant behavior in the event of an accident. However, WCAP-16011 demonstrated, and the NRC concurred, that the modified MTC verification is adequate to ensure that MTC stays within the limits. Therefore, there is not a significant increase in the consequences of any accident previously evaluated. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

No new or different accidents result from utilizing the proposed change. The changes do not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. In addition, the changes do not impose any new or different requirements or eliminate any existing requirements. The changes do not alter assumptions made in the safety analysis. The proposed changes are consistent with the safety analysis assumptions and current plant operating practice. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

This change will have no effect on the margin of safety. The MTC limits are unaffected and an acceptable method will be used to demonstrate that MTC is within its limit. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

02-Jun-05

5.2 Applicable Regulatory Requirements/Criteria

The regulations (10 CFR Part 50) do not deal explicitly with startup testing. In the past, the NRC staff exercised oversight based on the provisions of the applicable American National Standard Institute (ANSI), in this case ANSI/ANS 19.6.1. However, except for the NRC staff's general interest in preventing core abnormalities through startup testing, the value of the MTC (a quantity measured and validated in the startup tests) is in the technical specifications, and therefore, is subject to regulatory oversight.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

6.0 Environmental Consideration

A review has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

7.0 References

1. WCAP-16011-P-A, Rev. 0, "Startup Test Activity Reduction Program," dated February 2005.
2. Herbert N. Berkow (NRC) to Gordon Bischoff, dated January 14, 2005, "Final Safety Evaluation for Topical Report WCAP-16011-P, 'Startup Test Activity Reduction Program'."

Revision History

OG Revision 0

Revision Status: Closed

Revision Proposed by: WOG

Revision Description:

Original Issue

02-Jun-05

OG Revision 0**Revision Status: Closed****Owners Group Review Information**

Date Originated by OG: 02-Mar-05

Owners Group Comments:
Revised to address comments.

Owners Group Resolution: Superseded Date: 28-Mar-05

OG Revision 1**Revision Status: Active**

Revision Proposed by: CEOG

Revision Description:
Revised to reference WCAP-16011-P-A and to make various editorial improvements.**Owners Group Review Information**

Date Originated by OG: 28-Mar-05

Owners Group Comments:
(No Comments)

Owners Group Resolution: Approved Date: 06-Apr-05

TSTF Review Information

TSTF Received Date: 05-May-05 Date Distributed for Review: 05-May-05

OG Review Completed: BWOG WOG CEOG BWROGTSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 23-May-05

NRC Review Information

NRC Received Date: 03-Jun-05

Affected Technical Specifications

SR 3.1.3.1 MTC (Analog)

SR 3.1.3.1 MTC (Digital)

SR 3.1.3.1 Bases MTC (Analog)

SR 3.1.3.1 Bases MTC (Digital)

02-Jun-05

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify MTC is within the upper limit <u>specified in the COLR.</u>	<p>Prior to entering MODE 1 after each fuel loading</p> <p>[AND</p> <p>----- NOTE ----- <u>Only required to be performed when MTC determined prior to entering MODE 1 is verified using adjusted predicted MTC.</u></p> <p>-----</p> <p><u>Each fuel cycle within 7 effective full power days (EFPD) of reaching 40 EFPD core burnup]</u></p>
SR 3.1.3.2	<p>-----NOTE----- If the MTC is more negative than the <u>COLR-limit specified in the COLR</u> when extrapolated to the end of cycle, SR 3.1.3.2 may be repeated. Shutdown must occur prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit.</p> <p>-----</p> <p>Verify MTC is within the lower limit specified in the COLR.</p>	<p>Each fuel cycle within 7 effective full power days (EFPD) of reaching 40 EFPD core burnup</p> <p><u>AND</u></p> <p>Each fuel cycle within 7 EFPD of reaching 2/3 of expected core burnup</p>

 BASES

LCO

LCO 3.1.3 requires the MTC to be within specified limits of the COLR to ensure the core operates within the assumptions of the accident analysis. During the reload core safety evaluation, the MTC is analyzed to determine that its values remain within the bounds of the original accident analysis during operation. The limit on a positive MTC ensures that core overheating accidents will not violate the accident analysis assumptions. The negative MTC limit for EOC specified in the COLR ensures that core overcooling accidents will not violate the accident analysis assumptions.

MTC is a core physics parameter determined by the fuel and fuel cycle design and cannot be easily controlled once the core design is fixed. Limited control of MTC can be achieved by adjusting CEA position and boron concentration. During operation, ~~therefore,~~ the LCO can ~~only be~~ ensured through measurement and adjustments to CEA position and boron concentration. The surveillance checks at BOC and MOC on an MTC provide confirmation that the MTC is behaving as anticipated, so that the acceptance criteria are met.

APPLICABILITY

In MODE 1, the limits on the MTC must be maintained to ensure that any accident initiated from THERMAL POWER operation will not violate the design assumptions of the accident analysis. In MODE 2, the limits must also be maintained to ensure startup and subcritical accidents, such as the uncontrolled CEA or group withdrawal, will not violate the assumptions of the accident analysis. In MODES 3, 4, 5, and 6, this LCO is not applicable, since no Design Basis Accidents (DBAs) using the MTC as an analysis assumption are initiated from these MODES. However, the variation of the MTC, with temperature in MODES 3, 4, and 5, for DBAs initiated in MODES 1 and 2, is accounted for in the subject accident analysis. The variation of the MTC, with temperature assumed in the safety analysis, is accepted as valid once the BOC and MOC measurements are used for normalization.

ACTIONS

A.1

MTC is a function of the fuel and fuel cycle designs, and cannot be controlled directly once the designs have been implemented in the core. If MTC exceeds its limits, the reactor must be placed in MODE 3. This eliminates the potential for violation of the accident analysis bounds. The associated Completion Time of 6 hours is reasonable, considering the probability of an accident occurring during the time period that would require an MTC value within the LCO limits, and the time for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.1.3.1 and SR 3.1.3.2

The SRs for measurement of the MTC at the beginning and middle of each fuel cycle provide for confirmation of the limiting MTC values. The MTC changes smoothly from most positive (least negative) to most negative value during fuel cycle operation, as the RCS boron concentration is reduced to compensate for fuel depletion.

----- REVIEWER'S NOTE -----

The following Bases and the second Frequency of SR 3.1.3.1 are only applicable to plants that adopt WCAP-16011 (Reference 5).

[For fuel cycles that meet the applicability requirements in Reference 5, SR 3.1.3.1 may be met prior to entering MODE 1 after each fuel loading by confirmation that the predicted MTC, when adjusted for the measured RCS boron concentration, is within the most positive (least negative) MTC limit. If this adjusted predicted MTC value is used to meet the SR prior to entering MODE 1, a confirmation by measurement that MTC is within the upper MTC limit must be performed in MODE 1 within 7 Effective Full Power Days (EFPD) after reaching 40 EFPD of core burnup. The applicability requirements in Reference 5 ensure core designs are not significantly different from those used to benchmark predictions and require that the measured RCS boron concentration meets specific test criteria. This provides assurance that the MTC obtained from the adjusted predicted MTC is accurate.

For fuel cycles that do not meet the applicability requirements in Reference 5, the verification of MTC required prior to entering MODE 1 after each fuel loading is performed by measurement of the isothermal temperature coefficient. In this case, measurement of MTC within 7 EFPD after reaching 40 EFPD of core burnup is not required.]

[The requirement for measurement prior to operation > 5% RTP satisfies the confirmatory check on the most positive (least negative) MTC value.]

The requirement for measurement, within 7 days ~~EFPD~~ after reaching 40 ~~effective full power days~~ EFPD of core burnup, satisfies the confirmatory check of the most negative MTC value. The measurement is performed at any THERMAL POWER, so that the projected EOC MTC may be evaluated before the reactor actually reaches the EOC condition. MTC values may be extrapolated and compensated to permit direct comparison to the specified MTC limits.

BASES

**SURVEILLANCE
REQUIREMENTS**SR 3.1.3.1 and SR 3.1.3.2 (continued)

SR 3.1.3.2 is modified by a Note, which indicates that if the extrapolated MTC is more negative than the EOC COLR-limit specified in the COLR, the Surveillance may be repeated, and that shutdown must occur prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit. An engineering evaluation is performed if the extrapolated value of MTC exceeds the Specification limits.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 11.
 2. FSAR, Section [].
 3. FSAR, Section [].
 4. FSAR, Section [].
 5. WCAP-16011-P-A, Rev. 0, "Startup Test Activity Reduction Program," dated February 2005.
-

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify MTC is within the upper limit <u>specified in the COLR.</u>	<p>Prior to entering MODE 1 after each fuel loading</p> <p><u>[AND</u></p> <p><u>----- NOTE -----</u> <u>Only required to be performed when MTC determined prior to entering MODE 1 is verified using adjusted predicted MTC.</u> <u>-----</u></p> <p><u>Each fuel cycle within 7 effective full power days (EFPD) of reaching 40 EFPD core burnup]</u></p>
SR 3.1.3.2	<p><u>-----NOTE-----</u> If the MTC is more negative than the COLR-limit <u>specified in the COLR</u> when extrapolated to the end of cycle, SR 3.1.3.2 may be repeated. Shutdown must occur prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit.</p> <p><u>-----</u></p> <p>Verify MTC is within the lower limit <u>specified in the COLR.</u></p>	<p>Each fuel cycle within 7 effective full power days (EFPD) of reaching 40 EFPD core burnup</p> <p><u>AND</u></p> <p>Each fuel cycle within 7 EFPD of reaching 2/3 of expected core burnup</p>

 BASES

LCO LCO 3.1.3 requires the MTC to be within the specified limits of the COLR to ensure the core operates within the assumptions of the accident analysis. During the reload core safety evaluation, the MTC is analyzed to determine that its values remain within the bounds of the original accident analysis during operation. The limit on a positive MTC ensures that core overheating accidents will not violate the accident analysis assumptions. The negative MTC limit for EOC specified in the COLR ensures that core overcooling accidents will not violate the accident analysis assumptions.

MTC is a core physics parameter determined by the fuel and fuel cycle design and cannot be easily controlled once the core design is fixed. Limited control of MTC can be achieved by adjusting CEA position and boron concentration. During operation, therefore, the LCO can only be ensured through measurement and adjustments to CEA position and boron concentration. The surveillance checks at BOC and MOC on an MTC provide confirmation that the MTC is behaving as anticipated, so that the acceptance criteria are met.

APPLICABILITY In MODE 1, the limits on the MTC must be maintained to ensure that any accident initiated from THERMAL POWER operation will not violate the design assumptions of the accident analysis. In MODE 2, the limits must also be maintained to ensure startup and subcritical accidents, such as the uncontrolled CEA assembly or group withdrawal, will not violate the assumptions of the accident analysis. In MODES 3, 4, 5, and 6, this LCO is not applicable, since no Design Basis Accidents (DBAs) using the MTC as an analysis assumption are initiated from these MODES. However, the variation of the MTC, with temperature in MODES 3, 4, and 5, for DBAs initiated in MODES 1 and 2, is accounted for in the subject accident analysis. The variation of the MTC, with temperature assumed in the safety analysis, is accepted as valid once the BOC and MOC measurements are used for normalization.

ACTIONS A.1

MTC is a function of the fuel and fuel cycle designs, and cannot be controlled directly once the designs have been implemented in the core. If MTC exceeds its limits, the reactor must be placed in MODE 3. This eliminates the potential for violation of the accident analysis bounds. The associated Completion Time of 6 hours is reasonable, considering the probability of an accident occurring during the time period that would require an MTC value within the LCO limits, and the time for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.1.3.1 and SR 3.1.3.2

The SRs for measurement of the MTC at the beginning and middle of each fuel cycle provide for confirmation of the limiting MTC values. The MTC changes smoothly from most positive (least negative) to most negative value during fuel cycle operation, as the RCS boron concentration is reduced to compensate for fuel depletion.

----- REVIEWER'S NOTE -----

The following Bases and the second Frequency of SR 3.1.3.1 are only applicable to plants that adopt WCAP-16011 (Reference 5).

[For fuel cycles that meet the applicability requirements in Reference 5, SR 3.1.3.1 may be met prior to entering MODE 1 after each fuel loading by confirmation that the predicted MTC, when adjusted for the measured RCS boron concentration, is within the most positive (least negative) MTC limit. If this adjusted predicted MTC value is used to meet the SR prior to entering MODE 1, a confirmation by measurement that MTC is within the upper MTC limit must be performed in MODE 1 within 7 Effective Full Power Days (EFPD) after reaching 40 EFPD of core burnup. The applicability requirements in Reference 5 ensure core designs are not significantly different from those used to benchmark predictions and require that the measured RCS boron concentration meets specific test criteria. This provides assurance that the MTC obtained from the adjusted predicted MTC is accurate.

For fuel cycles that do not meet the applicability requirements in Reference 5, the verification of MTC required prior to entering MODE 1 after each fuel loading is performed by measurement of the isothermal temperature coefficient. In this case, measurement of MTC within 7 EFPD after reaching 40 EFPD of core burnup is not required.]

[The requirement for measurement prior to operation > 5% RTP satisfies the confirmatory check on the most positive (least negative) MTC value.]

The requirement for measurement, within 7 EFPD days-after reaching 40 EFPD effective-full-power-days-and a 2/3 core burnup, satisfies the confirmatory check of the most negative MTC value. The measurement is performed at any THERMAL POWER so that the projected EOC MTC may be evaluated before the reactor actually reaches the EOC condition. MTC values may be extrapolated and compensated to permit direct comparison to the specified MTC limits.

BASES

**SURVEILLANCE
REQUIREMENTS**SR 3.1.3.1 and SR 3.1.3.2 (continued)

SR 3.1.3.2 is modified by a Note, which indicates that if extrapolated MTC is more negative than the EOC GOLR-limit specified in the COLR, the Surveillance may be repeated, and that shutdown must occur prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit. An engineering evaluation is performed if the extrapolated value of MTC exceeds the Specification limits.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 11.
 2. FSAR, Section [].
 3. FSAR, Section [].
 4. FSAR, Section [].
 5. IWCAP-16011-P-A, Rev. 0, "Startup Test Activity Reduction Program," dated February 2005.
-
-