

Industry/TSTF Standard Technical Specification Change Traveler

Increase the Completion Time When the Core Reactivity Balance is Not Within Limit

Priority/Classification 3) Improve Specifications

NUREGs Affected: 1430 1431 1432 1433 1434

Description:

The Completion Time for actions taken when the core reactivity balance is not within limit is being increased from 72 hours to 7 days.

Justification:

The Actions require a reevaluation of core design and safety analysis and determination if the reactor core is acceptable for continued operation, and the establishment of appropriate operating restrictions and SRs within 72 hours. The 72 hours allocated to perform these actions is insufficient. Predicted versus measured reactivity anomaly evaluation is a very complex proposition. Data would have to be gathered, transmitted to the core design organization (which may be an offsite vendor, which would require additional administrative actions), evaluation by the vendor and implementation of appropriate controls put in place based on the data. Design codes, while increasingly more accurate, are more tailored to specific refueling cycles. Therefore, they take more time to set up for evaluations. If Boron-10 depletion may be a contributing factor, an RCS sample would likely be drawn and sent to an offsite laboratory for analysis. It is unlikely that this could be accomplished in 72 hours. Also, because exceeding this limit is very unlikely, it is important to allow sufficient time to properly analyze the causes. Even a quick evaluation would take more than 72 hours. The proposed 7 day period is sufficient to perform an evaluation.

The proposed 7 day period is acceptable because of the conservatism used in designing the reactor core and performing the safety analyses and the low probability of a DBA or anticipated transient approaching the core design limits occurring during the 7 day period.

Revision History

OG Revision 0

Revision Status: Active

Next Action:

Revision Proposed by: Calvert Cliffs

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 29-May-96

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 04-Jun-96

4/2/98

TSTF Review Information

TSTF Received Date: 01-Jul-96 Date Distributed for Review 31-Jul-96

OG Review Completed: BWOG WOG CEOG BWROG**TSTF Comments:**

BWOG - Applicable, BWOG accepts. BWOG also provided additional justification.

CEOG - agree to add additional justification.

WOG - Applicable, WOG accepts

BWROG - Not applicable, BWROG accepts.

TSTF Resolution: Approved Date: 10-Oct-96

NRC Review Information

NRC Received Date: 23-Jan-97 NRC Reviewer: Tjader, R.

NRC Comments:

3/3/97 - Referred to SRXB.

5/28/97 - SRXB recommended approval

5/29/97 - Reviewer recommended approval

5/29/97 - To C. Grimes for disposition

Final Resolution: NRC Approves

Final Resolution Date: 11-Aug-97

Incorporation Into the NUREGs

File to BBS/LAN Date:

TSTF Informed Date:

TSTF Approved Date:

NUREG Rev Incorporated:

Affected Technical Specifications

| | | |
|----------------------|------------------------------|---------------------|
| Action 3.1.2.A | Reactivity Balance | NUREG(s)- 1430 Only |
| Action 3.1.2.A Bases | Reactivity Balance | NUREG(s)- 1430 Only |
| Action 3.1.3.A | Core Reactivity | NUREG(s)- 1431 Only |
| Action 3.1.3.A Bases | Core Reactivity | NUREG(s)- 1431 Only |
| Action 3.1.3.A | Reactivity Balance (Analog) | NUREG(s)- 1432 Only |
| Action 3.1.3.A | Reactivity Balance (Digital) | NUREG(s)- 1432 Only |
| Action 3.1.3.A Bases | Reactivity Balance (Analog) | NUREG(s)- 1432 Only |
| Action 3.1.3.A Bases | Reactivity Balance (Digital) | NUREG(s)- 1432 Only |

4/2/98

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3.1 REACTIVITY CONTROL SYSTEMS

3.1.2 Reactivity Balance

LCO 3.1.2 The measured core reactivity balance shall be within $\pm 1\% \Delta k/k$ of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|--|--|--------------------|
| A. Measured core reactivity balance not within limit. | A.1 Re-evaluate core design and safety analysis and determine that the reactor core is acceptable for continued operation. | 72 hours |
| | <u>AND</u> A.2 Establish appropriate operating restrictions and SRs. | 7 days 72 hours |
| B. Required Action and associated Completion Time not met. | B.1 Be in MODE 3. | 6 hours |

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BASES

ACTIONS

A.1 and A.2 (continued)

calculations. Measured core and process parameters are evaluated to determine that they are within the bounds of the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of ~~72 hours~~ is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis.

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be resolved. If the cause of the reactivity anomaly is a mismatch in core conditions at the time of RCS boron concentration sampling, then a recalculation of the RCS boron concentration requirements may be performed to demonstrate that core reactivity is behaving as expected. If an unexpected physical change in the condition of the core has occurred, it must be evaluated and corrected, if possible. If the cause of the reactivity anomaly is in the calculation technique, then the calculational models must be revised to provide more accurate predictions. If any of these results are demonstrated, and it is concluded that the reactor core is acceptable for continued operation, then the boron letdown curve may be renormalized, and power operation may continue. If operational restrictions or additional surveillance requirements are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined.

7 days

The required Completion Time of ~~72 hours~~ is adequate for preparing operating restrictions or surveillances that may be required to allow continued reactor operation.

B.1

If the core reactivity cannot be restored to within the 1% $\Delta k/k$ limit, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours. If the SDM for MODE 3 is not met, then boration required by Required Action A.1 of LCO 3.1.1 would occur. The allowed

(continued)

3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Core Reactivity

LCO 3.1.3 The measured core reactivity shall be within $\pm 1\% \Delta k/k$ of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| <p>A. Measured core reactivity not within limit.</p> | <p>A.1 Re-evaluate core design and safety analysis, and determine that the reactor core is acceptable for continued operation.</p> <p><u>AND</u></p> <p>A.2 Establish appropriate operating restrictions and SRs.</p> | <p>72 hours</p> <p>7 days</p> <p>72 hours</p> |
| <p>B. Required Action and associated Completion Time not met.</p> | <p>B.1 Be in MODE 3.</p> | <p>6 hours</p> |

BASES

ACTIONS

A.1 and A.2 (continued)

the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of 12 hours is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis.

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be resolved. If the cause of the reactivity anomaly is a mismatch in core conditions at the time of RCS boron concentration sampling, then a recalculation of the RCS boron concentration requirements may be performed to demonstrate that core reactivity is behaving as expected. If an unexpected physical change in the condition of the core has occurred, it must be evaluated and corrected, if possible. If the cause of the reactivity anomaly is in the calculation technique, then the calculational models must be revised to provide more accurate predictions. If any of these results are demonstrated, and it is concluded that the reactor core is acceptable for continued operation, then the boron letdown curve may be renormalized and power operation may continue. If operational restriction or additional SRs are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined.

7 days

The required Completion Time of 12 hours is adequate for preparing whatever operating restrictions or Surveillances that may be required to allow continued reactor operation.

B.1

If the core reactivity cannot be restored to within the 1% $\Delta k/k$ limit, 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 at least MODE 3 within 6 hours. If the SDM for MODE 3 is not met, then the boration required by SR 3.1.1.1 would occur. The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

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3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Reactivity Balance (Analog)

LCO 3.1.3 The core reactivity balance shall be within $\pm 1\% \Delta k/k$ of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|--|--|-----------------|
| A. Core reactivity balance not within limit. | A.1 Re-evaluate core design and safety analysis and determine that the reactor core is acceptable for continued operation. | 72 hours |
| | <u>AND</u> A.2 Establish appropriate operating restrictions and SRs. | 72 hours |
| B. Required Action and associated Completion Time not met. | B.1 Be in MODE 3. | 6 hours |

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BASES

LCO
(continued)

These values are well within the uncertainty limits for analysis of boron concentration samples, so that spurious violations of the limit due to uncertainty in measuring the RCS boron concentration are unlikely.

APPLICABILITY

The limits on core reactivity must be maintained during MODES 1 and 2 because a reactivity balance must exist when the reactor is critical or producing THERMAL POWER. As the fuel depletes, core conditions are changing, and confirmation of the reactivity balance ensures the core is operating as designed. This Specification does not apply in MODES 3, 4, and 5 because the reactor is shut down and the reactivity balance is not changing.

In MODE 6, fuel loading results in a continually changing core reactivity. Boron concentration requirements (LCO 3.9.1, "Boron Concentration") ensure that fuel movements are performed within the bounds of the safety analysis. An SDM demonstration is required during the first startup following operations that could have altered core reactivity (e.g., fuel movement, or CEA replacement, or shuffling).

ACTIONS

A.1 and A.2

Should an anomaly develop between measured and predicted core reactivity, an evaluation of the core design and safety analysis must be performed. Core conditions are evaluated to determine their consistency with input to design calculations. Measured core and process parameters are evaluated to determine that they are within the bounds of the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of 72 hours is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis.

7 days

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be

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BASES

ACTIONS

A.1 and A.2 (continued)

resolved. If the cause of the reactivity anomaly is a mismatch in core conditions at the time of RCS boron concentration sampling, then a recalculation of the RCS boron concentration requirements may be performed to demonstrate that core reactivity is behaving as expected. If an unexpected physical change in the condition of the core has occurred, it must be evaluated and corrected, if possible. If the cause of the reactivity anomaly is in the calculation technique, then the calculational models must be revised to provide more accurate predictions. If any of these results are demonstrated, and it is concluded that the reactor core is acceptable for continued operation, then the boron letdown curve may be renormalized, and power operation may continue. If operational restrictions or additional SRs are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined.

7 days

The required Completion Time of ~~12 hours~~ is adequate for preparing whatever operating restrictions or Surveillances that may be required to allow continued reactor operation.

B.1

If the core reactivity cannot be restored to within the 1% $\Delta k/k$ limit, 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 at least MODE 3 within 6 hours. If the SDM for MODE 3 is not met, then boration required by SR 3.1.1.1 would occur. The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE
REQUIREMENTS

SR 3.1.3.1

Core reactivity is verified by periodic comparisons of measured and predicted RCS boron concentrations. The comparison is made considering that other core conditions are fixed or stable including CEA position, moderator temperature, fuel temperature, fuel depletion, xenon concentration, and samarium concentration. The Surveillance

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3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Reactivity Balance (Digital)

LCO 3.1.3 The core reactivity balance shall be within $\pm 1\% \Delta k/k$ of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|--|--|-------------------------------|
| A. Core reactivity balance not within limit. | A.1 Re-evaluate core design and safety analysis and determine that the reactor core is acceptable for continued operation. | 72 hours 7 days |
| | <u>AND</u> A.2 Establish appropriate operating restrictions and SRs. | 72 hours |
| B. Required Action and associated Completion Time not met. | B.1 Be in MODE 3. | 6 hours |

BASES

LCO
(continued)

These values are well within the uncertainty limits for analysis of boron concentration samples, so that spurious violations of the limit due to uncertainty in measuring the RCS boron concentration are unlikely.

APPLICABILITY

The limits on core reactivity must be maintained during MODES 1 and 2 because a reactivity balance must exist when the reactor is critical or producing THERMAL POWER. As the fuel depletes, core conditions are changing, and confirmation of the reactivity balance ensures the core is operating as designed. This Specification does not apply in MODES 3, 4, and 5 because the reactor is shut down and the reactivity balance is not changing.

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ACTIONS

A.1 and A.2

Should an anomaly develop between measured and predicted core reactivity, an evaluation of the core design and safety analysis must be performed. Core conditions are evaluated to determine their consistency with input to design calculations. Measured core and process parameters are evaluated to determine that they are within the bounds of the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of ~~12 hours~~ is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis.

7 days

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be

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BASES

ACTIONS

A.1 and A.2 (continued)

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SURVEILLANCE
REQUIREMENTS

SR 3.1.3.1

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