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TECHNICAL SPECIFICATIONS TASK FORCE
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SUBJECT: Technical Specification Task Force (TSTF) Response to November 10, 2009 Federal Register Notice, "Notice of Opportunity for Public Comment on the Proposed Model Safety Evaluation for Plant-Specific Adoption of Technical Specification Task Force Traveler-493, Revision 4, 'Clarify Application of Setpoint Methodology for LSSS Functions'," **Docket ID NRC-2009-0487**

Enclosed for NRC consideration are comments prepared by the Technical Specification Task Force (TSTF) on the subject November 10, 2009 Federal Register Notice on TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions."

During the NRC's review of the Traveler, changes were identified to make TSTF-493 consistent with the justification and the NRC's model Safety Evaluation published in the Notice for Comment. The TSTF confirmed that these changes are consistent with the intent of TSTF-493 and agreed to provide revised pages.

Attachment A contains the affected pages for Option A of TSTF-493. Attachment B contains the affected pages for Option B of TSTF-493. Unless otherwise indicated, the original TSTF-493, Revision 4, changes are shown in red and the revisions are shown in blue. When necessary for clarity, pages unaffected are included.

The TSTF will submit a complete copy of TSTF-493, Revision 4, incorporating the revised pages in December, 2009.

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SUNSI Review Complete

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

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Enclosure
Attachments

cc: Robert Elliott, Technical Specifications Branch, NRC
Michelle Honcharik, Special Projects Branch, NRC

Technical Specification Task Force (TSTF) Response to November 10, 2009 Federal Register Notice, "Notice of Opportunity for Public Comment on the Proposed Model Safety Evaluation for Plant-Specific Adoption of Technical Specification Task Force Traveler-493, Revision 4, 'Clarify Application of Setpoint Methodology for LSSS Functions'," Docket ID NRC-2009-0487

General Comments

1. In the Notice, the model application, and the proposed model Safety Evaluation there are statements such as, "includes the calculation basis for the Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance band, and As-Left Tolerance band for each change." This wording implies that there are two distinct values to be presented - an LTSP and an NTSP. As stated in Footnote 3 of the proposed model Safety Evaluation, "Throughout this SE and the proposed TS changes, the terms 'Limiting Trip Setpoint' and 'Nominal Trip Setpoint' and their abbreviations, 'LTSP' and 'NTSP' are shown in brackets (e.g., '[LTSP]'). In all cases, the term 'Limiting Trip Setpoint' may be replaced in the Technical Specifications and in the TS Bases by a term (e.g., NTSP) consistent with the plant-specific setpoint methodology." In some cases, the Notice correctly states, "[LTSP/NTSP]," but not in all cases. The Notice should be searched and it should be clear in all instances that only the LTSP or NTSP should be specified, not both.

Comments on the Notice

2. The Notice states, "The Proposed Models for Plant-Specific Adoption of TSTF Traveler-493, Revision 4, are available electronically under ADAMS Accession Number ML093080028." For clarity, the sentence should be revised to state that the proposed model application, model Safety Evaluation, and proposed No Significant Hazards Consideration Determination are available electronically under ADAMS Accession Number ML093080028.

3. The Notice, in the section titled "Applicability," states, "The Traveler revises the TS instrument function values related to those variables that have a significant safety function." This sentence would only be applicable to plants adopting Option A with changes to setpoint values. In addition, as noted in comments below, the reference to "variables that have a significant safety function" is incorrect. We recommend the sentence be deleted.

4. The Notice, in two locations in the section entitled "Applicability," states "The licensee must propose to add footnotes to all the functions identified in TSTF Traveler-493, Revision 4, Appendix A, and must incorporate the related TS Bases changes." Similar statements are made in the proposed model Safety Evaluation. These statements are not correct. As stated on Page 10 of the justification of TSTF-493, "Each licensee proposing to adopt this Traveler must review the list of Functions in Attachment A to confirm that the identified functions are consistent with their plant specific design." These sentences should be revised to state that the licensee must propose footnotes to the *applicable* functions identified in TSTF Traveler-493, Revision 4, Appendix A.

5. The Notice, in the section titled, "Adoption of TSTF Traveler-493 with Option B - the Setpoint Control Program Option," states, "The licensee must provide the content and application of the plant-specific setpoint methodology required by the SCP TS 5.5.[18] Paragraph b. This includes the calculation basis for the LTSP, NTSP, AV, As-Found Tolerance band, and As-Left Tolerance band for each automatic protection instrumentation function." This section should be clarified to state that it is not necessary to describe the

calculation basis for the current setpoint value. The current setpoint values were approved by the NRC. The Setpoint Control Program controls future changes to the subject setpoints."

Comments on the Model Application

6. The mailing address specified in the model application is not consistent with the address specified in 10 CFR 50.4. The regulations require submitting license amendments to ATTN: Document Control Desk, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. The model application should be revised.

7. The model application cover letter states, "[Discuss any differences with Traveler-493, Revision 4.] This level of detail is not included in a license amendment request cover letter. We recommend that the bracketed sentence be deleted.

8. The model application states that Attachment 4 (for Option A) or Attachment 7 (for Option B) contains a listing of the proposed regulatory commitments. The model application and model Safety Evaluation do not specify any regulatory commitments. Therefore, reference to these attachments should be deleted.

9. Section 1.0, "Description," of Attachment 1 to the model application, third paragraph, contains the sentence, "[Minor differences between the proposed plant-specific TS changes, and the changes proposed by Traveler-493 are listed in Section 2.0.]" We recommend that this sentence be deleted. The sentence adds no value. Section 2.0 describes all differences (minor or otherwise) or states that there are no differences. Note that the bracketed sentence appears in both the Option A and Option B paragraphs.

10. The model application, Attachment 1, "Evaluation of Proposed Change," Section 1.0, "Description," states, "The proposed amendment would revise the Technical Specifications (TS) by adding new test requirements to instrument Functions related to those variables that have a significant safety function, thereby ensuring instruments will function as required to initiate protective systems or actuate mitigating systems at the point assumed in the applicable safety analysis." This appears both under the Option A and Option B paragraphs. This statement is overly broad and does not describe the proposed changes in TSTF-493, Revision 4. It should be revised to state, "The proposed amendment would revise the Technical Specifications (TS) by applying additional testing requirements on the applicable instrument Functions listed in TSTF-493, Revision 4, Appendix A, in order to ensure the instruments will function as assumed in the applicable safety analysis."

11. The model application, Attachment 1, "Evaluation of Proposed Change," Section 1.0, "Description," the fifth paragraph, states, "These TS changes are made by adoption of a Setpoint Control Program that contains the setpoint methodology and parameters used in the calculation and ...". The phrase "parameters used in the calculation" is not consistent with any of the proposed requirements in the Setpoint Control Program and should, therefore, be eliminated.

12. The proposed Model Safety Evaluation, Section 3.0, "Technical Evaluation," quotes Notes 1 and 2. The quote of Note 2 in Section 3.1.1 is correct only for NUREG-1431. The NUREG-1431 Note 2 states "(field setting)" after "Surveillance procedures." The other STS NUREGs have the term "(Nominal Trip Setpoint)" in lieu of "(field setting)." As a general comment, whenever Note 2 is discussed in a general context for all five STS NUREGs, it should use bracketed terms such as [field setting or NTSP], or the discussion should include STS NUREG-specific annotations such as found in Sections 3.1.2 and 3.1.4 of the model Safety Evaluation.

13. In previous Notices, the NRC stated that use of plant-specific system names, specification numbers, and titles is acceptable. This Notice does not make such a statement. We recommend it be added to the end of Attachment 1, Section 2.0, "Proposed Change," of the model application.

14. Section 5.1 of Attachment 1 to the proposed model application is titled "No Significant Hazards Determination." In order to be consistent with the terminology used in Regulatory Issue Summary 2001-22, "Attributes of a Proposed No Significant Hazards Consideration Determination," and industry practice, we recommend using the title, "No Significant Hazards Consideration Determination" (NSHCD) in the model application.

15. Section 5.1 of Attachment 1 to the proposed model application, "No Significant Hazards Determination," (NSHD) [sic] contains two conflicting statements. It first states that the licensee has reviewed the NSHCD published in the Federal Register and concluded that it is applicable. It then states that the licensee has performed an NSHCD evaluation and requires that the licensee provide their analysis.

    Regulatory Issue Summary 2000-06, "Consolidated Line Item Improvement Process for Adopting Standard Technical Specifications Changes for Power Reactors," states (emphasis added):

    > *In an effort to make the NRC work processes more visible, the NRC staff will solicit stakeholder comments on the associated change to the STS, the staff's safety evaluation (SE), and the <u>proposed no significant hazards consideration determination (PNSHCD)</u> before finalizing its acceptance of a TSTF change. Following NRC acceptance of a TSTF change, licensees, as well as the NRC staff, will be able to use the relevant documentation from the NRC-accepted TSTF change in the preparation and processing of license amendment applications.*
    >
    > ...
    >
    > *The licensees desiring to adopt a specific TSTF change using the CLIIP will need to verify that the proposed change is applicable to their facilities. The NRC announcement and the staff's SE will specify any plant-specific verification or other information required in licensees' applications. <u>The licensees may apply for license amendments by</u>*

> *citing the applicability of the PNSHCD and the SE for the accepted TSTF change and addressing any plant-specific information needed to support the staff's review.*
>
> ...
>
> *Finally, with the licensee's adoption of the uniform description of the proposed change, the PNSHCD, and the SE for a TSTF change request, the CLIIP would provide more disciplined and consistent adoption of the STS by way of a streamlined amendment process.*

Referencing the NSHCD published in the Federal Register has been used in the 35 model applications published by the NRC to date under the CLIIP.

We acknowledge that the NRC has chosen to apply the term "CLIIP" to only those TSTF Travelers that may be adopted by a license amendment request reviewed by only the NRC Technical Specification Branch. However, the process described in RIS 2000-06 is applied to all TSTF Travelers approved by the NRC, including TSTF-493.

Requiring each licensee to submit a NSHCD reduces public involvement in the CLIIP by rendering the NSHCD published in the Federal Register essentially irrelevant and undermines the "disciplined and consistent adoption" of the Traveler under a streamlined amendment process. The proposed model amendment also places the licensee in the position of either deviating from the model application or submitting an NRC developed NSHCD as if it were their own.

The TSTF has considered the legal requirements regarding the submittal of a NSHCD. 10 CFR 50.91, "Notice for public comment; State consultation," states, "(a) Notice for public comment. (1) At the time a licensee requests an amendment, it must provide to the Commission, in accordance with the distribution requirements specified in § 50.4, its analysis about the issue of no significant hazards consideration using the standards in § 50.92." There is no prohibition from referencing a NSHCD in a publically available source, such as the Federal Register. Licensees frequently reference other sources in their license amendment requests, such as NRC-approved Topical Reports, Regulatory Guides, and Codes and Standards. There is no basis for requiring that the NSHCD be repeated in the licensee's amendment request when doing so undermines the public involvement in the CLIIP.

The TSTF recommends that Section 5.1 be revised to reference the NSHCD published in the Federal Register, consistent with the process described in RIS 2000-06.

16. Attachment 1, Section 6.0, "Environmental Consideration," contains two conflicting statements. It first states that the licensee has reviewed the environmental evaluation published in the Federal Register and concluded that it is applicable. It then restates the environmental consideration.

The environmental considerations section of the model application satisfies 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review." Paragraph 10 CFR 51.22(b) states, "Except in special circumstances, as determined by the Commission upon its own initiative or upon request of any interested person, an environmental assessment or an environmental impact statement is not required for any action within a category of actions included in the list of categorical exclusions set out in paragraph (c) of this section." The purpose of the "Environmental Consideration" section is to demonstrate that a categorical exclusion applies and an environmental review is not required. Referencing the Environmental Consideration section of the Federal Register Notice satisfies the requirement and increases public involvement in the determination through the CLIIP Notice for Comment.

The TSTF recommends that Section 6.0 be revised to reference the Environmental Consideration published in the Federal Register.

Comments on the Proposed No Significant Hazards Determination

17. The proposed Model No Significant Hazards Consideration Determination (NSHCD), Question 1 response for Option B, states, "The proposed change also allows the relocation of the plant-specific setpoints to licensee control provided the NRC has approved the methodology used to calculate the setpoints and that future changes to the setpoints are controlled under a TS Setpoint Control Program (SCP)." This sentence incorrectly implies that the NRC must have approved the methodology used to calculate the current setpoints as a condition of their relocation. It should be revised to state, "The proposed change also allows the relocation of the plant-specific setpoints to licensee control provided the NRC has approved the methodology used to calculate *future changes to* the setpoints and that future changes to the setpoints are controlled under a TS Setpoint Control Program (SCP).

Comments on the Proposed Model Safety Evaluation

18. The proposed model Safety Evaluation contains multiple instances of the phrase, "a document controlled under 10 CFR 50.59." The TSTF and the NRC agreed to replace this phrase with a phrase similar to "a document incorporated by reference into the facility UFSAR." The model Safety Evaluation should be searched and the appropriate phrase used.

19. Section 1.0, "Introduction," of the proposed model Safety Evaluation, states, "The proposed changes would revise the TSs with respect to limiting safety system settings (LSSSs) assessed during periodic testing and calibration of instrumentation that may have an adverse effect on equipment operability." This statement, and statements similar to it, appear throughout the proposed model Safety Evaluation. These statements are incorrect.

    TSTF-493 proposes to add footnotes or requirements in an Administrative Controls program with respect to periodic testing and calibration of instrumentation associated with the Functions listed in Appendix A of TSTF-493. TSTF-493 does not state, and the TSTF does not agree, that all of the Functions in Appendix A are limiting safety system settings. As

stated in the TSTF's February 23, 2009 letter to the NRC, "Industry Plan to Resolve TSTF-493, 'Clarify Application of Setpoint Methodology for LSSS Functions'," "The industry agreement to annotate these functions with the TSTF-493 footnotes does not represent industry acceptance of the NRC's definition of SL-LSSS in Reference 2 or agreement that the functions to be annotated are LSSS, that the functions protect a Safety Limit, or that the functions meet a 10 CFR 50.36(c)(2) criteria."

The NRC's safety evaluation for a license amendment cannot be based on arguments that were not presented by the applicant. All references to "limiting safety system settings" and phrases such as "variables that have a significant safety function", which are based on the 10 CFR 50.36 definition of limiting safety system settings, must be removed and replaced with a reference to the functions in listed in TSTF-493, Revision 4, Attachment A.

20. Section 1.0, "Introduction," of the proposed model Safety Evaluation, states, "Additionally, as part of the review process it was determined that TSTF Traveler-411 had not been correctly implemented in NUREG-1431. Corrections have been made to TS 3.3.6, Containment Purge and Exhaust Isolation Instrumentation, Table 3.3.6-1 and TS 3.3.7, Control Room Emergency Filtration System (CREFS) Actuation Instrumentation, Table 3.3.7-1." The proposed model Safety Evaluation is for plant-specific adoption of TSTF-493. These sentences should be bracketed, to indicate that they are plant-specific, and revised to state "not been correctly implemented in NUREG-1431 and [PLANT]'s Technical Specifications."

21. Section 1.0, "Introduction," of the proposed model Safety Evaluation, states, "The new program, entitled the Setpoint Control Program (SCP or the program), references an NRC-approved methodology for determining and verifying instrument setpoints and ...". The Setpoint Control Program is structured to allow more than one setpoint methodology to be referenced. We recommend that the sentence be revised to state, "... references an NRC-approved methodology *or methodologies* for determining ...". This is correctly stated in the second paragraph of the cover letter of the model application, but is incorrectly stated as singular in many other locations throughout the Notice.

22. The proposed model Safety Evaluation, Section 1.0, "Introduction," states "The new program, entitled the Setpoint Control Program (SCP or the program), references an NRC-approved methodology for determining and verifying instrument setpoints and includes requirements that serve the same purpose as the Notes added to SRs under Option A of TSTF Traveler-493, Revision 4." It is unclear what is meant by "determining" in the phrase "references an NRC-approved methodology for determining and verifying instrument setpoints...". The Notes in Option A are not related to determining setpoints. We recommend that the phrase "determining and" be deleted from the sentence.

23. The proposed model Safety Evaluation, Section 1.0, "Introduction," in the discussion of Note 1 states, "The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. The performance of these channels

will be evaluated under the plant Corrective Action Program (CAP). Entry into the CAP will ensure required review and documentation of the condition to establish a reasonable expectation for continued operability." In Section 1.1 of the proposed model Safety Evaluation, it states, "To address Concept 7, the revised TS Bases state that when a channel's As-Found value is outside the As-Found Tolerance band, the potentially degraded instrument must be entered into the licensee's CAP. The CAP evaluation is expected to be performed promptly to validate the determination that was performed prior to returning the channel to service and to confirm that the channel is operable and performing as expected." These statements could be misinterpreted to mean that the CAP evaluation must be completed prior to returning the channel to service. We recommend the Section 1.0 paragraph be revised to state, "The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. *In addition,* the performance of these channels will be evaluated under the plant Corrective Action Program (CAP). Entry into the CAP will ensure required review and documentation of the condition to establish a reasonable expectation for continued operability." We recommend that the Section 1.1 paragraph be revised to state, "To address Concept 7, the revised TS Bases state that when a channel's As-Found value is outside the As-Found Tolerance band, *channel Operability must be evaluated prior to returning the channel to service. In addition,* the potentially degraded instrument must be entered into the licensee's CAP. The CAP evaluation is expected to be performed promptly to validate the determination that was performed prior to returning the channel to service and to confirm that the channel is ~~operable and~~ performing as expected."

24. The TSTF recommends that Section 1.1 of the proposed model Safety Evaluation, entitled, "Development of TSTF-493, Revision 4," be substantially revised. The section is confusing because many of the discussions and issues discussed were superseded by the industry approach described in the February 23, 2009 letter. The discussion of the historical development of TSTF-493 is only applicable to the wording of the Option A footnotes or the equivalent requirements in the Option B Setpoint Control Program. Section 1.1 should be revised to discuss only the seven concepts and how those concepts were expressed in the Option A footnotes and the Option B Setpoint Control Program. The discussion of RIS 2006-17 should be eliminated. While the NRC staff may be satisfied that TSTF-493, Revision 4, satisfies the position in RIS 2006-17, it is not the technical basis for TSTF-493, Revision 4, and the TSTF does not agree that all of RIS 2006-17 is applicable to TSTF-493.

25. The proposed model Safety Evaluation, Section 2.0, "Regulatory Evaluation," states, "Plant protective systems are designed to initiate reactor trips (scrams) or other protective actions before selected unit parameters exceed ALs assumed in the safety analysis in order to prevent violation of the Reactor Core SLs and RCS Pressure SL from postulated Anticipated Operational Occurrences (AOOs) and accidents." This statement is incorrect. Safety Limits are not protected during accidents, only during AOOs. The phrase "and accidents" should be deleted from the sentence.

26. Section 3.1.2, "Technical Bases," of the proposed model Safety Evaluation states, "Setpoint calculations calculate a [LTSP/NTSP] based on the AL of the Safety Analysis to ensure that trips or protective actions will occur prior to the process parameter exceeding the SL as required by the Safety Analysis calculations." This is an incorrect statement. Safety Limits may be exceeded in safety analysis calculations for design basis accidents. The sentence should be revised to state, "Setpoint calculations calculate a [LTSP/NTSP] based on the AL of the Safety Analysis to ensure that trips or protective actions will occur prior to *exceeding* the process parameter *value assumed in the* Safety Analysis calculations."

27. Section 3.2, "Technical Evaluation for Option A Without Changes to Setpoint Values," Section 3.2.1, "Addition of Footnote to TS Tables," of the proposed model Safety Evaluation states, "Furthermore, the licensee stated that if during calibration testing the setpoint is found to be conservative with respect to the LSSS but outside its predefined calibration tolerance, then the channel shall be brought back to within its predefined calibration tolerance before returning the channel to service." This is incorrect. The sentence should be revised to state, "Furthermore, the licensee stated that if during calibration testing the setpoint is found to be conservative with respect to the ~~LSSS~~ *AV* but outside its predefined As-Found Tolerance band, then the channel shall be brought back to within its predefined calibration tolerance before returning the channel to service." The text in this section should match that in Section 3.2, "Technical Evaluation for Option A with Changes to Setpoint Values," Section 3.2.2, "Addition of Footnotes to TS Tables." The latter should also contain the following two sentences from the former: "The calibration tolerances are specified in the TRM or a document incorporated by reference in the UFSAR. Changes to the values will be controlled by 10 CFR 50.59." 28. Section 3.2, "Option B Technical Evaluation of TS Changes Using the Setpoint Control Program," Section 3.2.1, "Setpoint Control Program TS 5.5.[18]," of the proposed model Safety Evaluation contains a typographical error. The reference to 10 CFR 50.369 should state 10 CFR 50.36.

<u>Comments on Attachment A of the Proposed Model Safety Evaluation</u>

29. Attachment A of the proposed model Safety Evaluation is titled, "TS Instrumentation Functions LSSS." This title is incorrect and should be revised to eliminate the acronym "LSSS." TSTF-493 does not state, and the TSTF does not agree, that all of the Functions in Appendix A are limiting safety system settings. As stated in the TSTF's February 23, 2009 letter to the NRC, "Industry Plan to Resolve TSTF-493, 'Clarify Application of Setpoint Methodology for LSSS Functions'," "The industry agreement to annotate these functions with the TSTF-493 footnotes does not represent industry acceptance of the NRC's definition of SL-LSSS in Reference 2 or agreement that the functions to be annotated are LSSS, that the functions protect a Safety Limit, or that the functions meet a 10 CFR 50.36(c)(2) criteria."

30. Attachment A, "TS Instrumentation Functions LSSS," of the proposed model Safety Evaluation incorrectly describes the list of functions to which the Option A footnotes will be applied as LSSS functions. TSTF-493 does not state, and the TSTF does not agree, that all of the Functions in Appendix A are limiting safety system settings. As stated in the TSTF's

February 23, 2009 letter to the NRC, "Industry Plan to Resolve TSTF-493, 'Clarify Application of Setpoint Methodology for LSSS Functions'," "The industry agreement to annotate these functions with the TSTF-493 footnotes does not represent industry acceptance of the NRC's definition of SL-LSSS in Reference 2 or agreement that the functions to be annotated are LSSS, that the functions protect a Safety Limit, or that the functions meet a 10 CFR 50.36(c)(2) criteria."

31. Attachment A, "TS Instrumentation Functions LSSS," of the proposed model Safety Evaluation states, "Therefore, NRC staff concludes that all the functions identified in TS 3.3.1 and TS 3.3.2 meet the requirements of 10 CFR 50.36(c)(1)(ii)(A)." It is not clear to which STS NUREG the statement is referring, but regardless the statement should be deleted. TSTF-493, Revision 4, provided no evaluation of whether the functions in TS 3.3.1 and 3.3.2 meet the requirements of 10 CFR 50.36(c)(1)(ii)(A) and such a conclusion is not related to TSTF-493, Revision 4.

32. Attachment A, "TS Instrumentation Functions LSSS," of the proposed model Safety Evaluation states, " ...except for the functions which met the three exclusion criteria discussed above. The NRC staff finds these exceptions acceptable because these instrument functions do not have components required to meet As-Left and As-Found acceptance bands; values necessary to make the determination during testing whether the instrument is operable or needs to be replaced." The statement includes the unsupported conclusion that the functions being excepted cannot be repaired, only replaced. We recommend deleting the ending of the sentence following the semicolon.

33. Attachment A, "TS Instrumentation Functions LSSS," of the proposed model Safety Evaluation provides a list of functions for each ISTS NUREG. For those unfamiliar with the list of functions, the numbering may be confusing. We recommend adding the following sentence prior to the list of NUREG-1430 functions, "The function numbers listed below are from the corresponding ISTS NUREG."

34. To improve usability of Attachment A, "TS Instrumentation Functions LSSS," of the proposed model Safety Evaluation, we recommend that the Notes "(Permissive or interlock excluded from footnote)" be expanded to include "it if derives input from a sensor or adjustable device that is tested as part of another TS function."

35. In Attachment A of the proposed model Safety Evaluation, "TS Instrumentation Functions LSSS," under the list of Functions to be annotated in NUREG-1431, Specification 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," delete Function 3, "a. Phase A Isolation," and Function 5, "c. Safety Injection (Automatic actuation logic circuit excluded from footnotes)." They are listed under the excluded functions.

36. There is a typographical error in Attachment A of the proposed model Safety Evaluation, "TS Instrumentation Functions LSSS," under the list of Functions Excluded from Notes in

NUREG-1431, Specification 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," Function 4.g. There is an extraneous "t" between "excluded" and "from".

37. In Attachment A of the proposed model Safety Evaluation, "TS Instrumentation Functions LSSS," under the list of Functions to be annotated in NUREG-1432, Specification 3.3.5, ""Engineered Safety Features Actuation System Instrumentation (Digital)," delete Function 2, "b. Automatic SIAS." The function is listed under the excluded functions.

38. In Attachment A of the proposed model Safety Evaluation, "TS Instrumentation Functions LSSS," under the list of Functions to be annotated in NUREG-1433, Specification 3.3.5.1, "Emergency Core Cooling System Instrumentation," delete Function 2, "f. Low Pressure Coolant Injection Pump Start - Time Delay Relay." The function is listed under the excluded functions.

Attachment A

TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions"

Revised Option A Pages

1.0 Description

The proposed change revises the Technical Specifications to address NRC concerns that the Technical Specification (TS) requirements for Limiting Safety System Settings (LSSS) may not be fully in compliance with the intent of 10 CFR 50.36. Specifically, the NRC is concerned that the existing Surveillance Requirements (SRs) do not provide adequate assurance that instruments will always actuate safety functions at the point assumed in the applicable safety analysis. While the industry does not necessarily agree with the NRC's concern, this Traveler addresses the issue. The agreement to resolve the issue is documented in a letter from the Technical Specification Task Force (TSTF) to the NRC dated February 23, 2009 (ADAMS accession number ML090540849) and was accepted in a letter from the NRC to the TSTF dated March 9, 2009 (ADAMS accession number ML090560592). These letters are attached to this Traveler. This proposed change is consistent with the agreement.

2.0 Proposed Change

The agreement provides for two separate options to address the issue. The first option (Option A) results in the placement of Notes in Technical Specification Tables for the agreed upon functions. The second option (Option B) adds a program to the Administrative Controls section of the Technical Specifications. The new program, titled the Setpoint Control Program, references an NRC-approved methodology for determining and verifying instrument setpoints. In addition to addressing the NRC's concern, Option B allows the relocation of the instrument setpoint values from the Technical Specifications to licensee control.

Throughout this document and the proposed TS changes, the terms "Limiting Trip Setpoint" and "Nominal Trip Setpoint" and their abbreviations, "LTSP" and "NTSP" are shown in brackets (e.g., "[LTSP]"). In all cases, the term "Limiting Trip Setpoint" may be replaced in the Technical Specifications and in the Bases by a term (e.g. NTSP) consistent with the plant-specific setpoint methodology.

Description of Option A Proposed Changes

Under Option A, two Notes are added in the Surveillance Requirements column in the specification's Function table. ~~If the specification does not contain a Function table with a Surveillance Requirements column, the Notes are added to the table's Allowable Value column.~~ If the specification does not include a Surveillance Requirements column or a Function table, then the Notes are added to the applicable Surveillance Requirements.

Notes are added to SRs that verify trip setpoint settings. The Surveillance Requirements to which the Notes are applied vary due to vendor-specific testing terminology. In NUREG-1430, 1432, 1433, and 1434, the Notes are added to the Channel Calibration SRs, and to Channel Functional Test SRs that verify trip setpoints. In NUREG-1431, the Notes are added to the Channel Calibration, and Channel Operational Test (COT), SRs that verify trip setpoints.

These two Notes are applied to the Functions listed in Appendix A. They include instrument functions in the LCOs for the Reactor Trip System (also called the Reactor Protection System), the Engineered Safety Feature Actuation System (also called the Emergency Core Cooling System and some instrument functions in other LCOs identified in the boiling water reactor (BWR) specifications (i.e., NUREG-1433 and NUREG-1434).

The two Notes added to the Surveillance Requirements are:

1: If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

2: The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [Limiting Trip Setpoint (LTSP) or Nominal Trip Setpoint (NTSP)] at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the [LTSP or NTSP] are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance. The [Limiting Trip Setpoint or Nominal Trip Setpoint and the] methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]
~~insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR~~].

In NUREG-1430, 1432, 1433, and 1434, the Technical Specification Function tables contain the Allowable Value. These specifications are referred to as having the "single column" format. In NUREG-1431, the option is given to list only the Allowable Value or to list the Allowable Value and the [Nominal Trip Setpoint (NTSP)]. This second option is referred to as the "multiple columns" format; in this presentation, the [NTSP] is the LSSS. Those plants that utilize the "multiple column" format are not required to incorporate the NTSP value in the last sentence in Note 2 because any change to the value requires prior NRC review and the values cannot be changed by the licensee under 10 CFR 50.59. For plants that specify the [NTSP] or [LTSP] instead of the Allowable Value, the same restrictions apply and the identification of the [LTSP] or [NTSP] in the last sentence in Note 2 is not required.

The Bases are revised to reflect the addition of the Notes to the applicable Functions. The Bases are also revised to define the term "Limiting Trip Setpoint" or "Nominal Trip Setpoint," and to discuss the relationship of the LSSS to other values, such as the Allowable Value and the [NTSP] or [LTSP]. The Bases provide details on the implementation of the requirements described in the Notes and the relationship between the as-found value and Function OPERABILITY. Where necessary to provide context for the other changes, a description of the use of [LTSP] and Allowable Value is added to the Specification Bases, similar to the discussion in the reactor trip system Specification Bases.

In addition, for each ISTS Section 3.3 instrumentation trip or actuation function not annotated with the Notes described above, the Surveillance Requirement Bases for surveillances that verify the setpoint are modified to state:

tolerance will ensure that channel operation is consistent with the assumptions or design inputs used in the setpoint calculations and that there is a high confidence of acceptable channel performance in the future. Because the tolerance is two sided, changes in channel performance that are conservative will also be detected and evaluated for possible effects on expected performance.

Implementation of Note 1 requires the licensee to calculate an as-found tolerance. One acceptable method of calculating the as-found tolerance is the Square Root Sum of the Squares (SRSS) combination of either a) Reference Accuracy (RA), Measurement and Test Equipment (M&TE) error, M&TE readability (M&TEr) and projected drift, or b) as-left tolerance and the projected drift (assuming that as-left tolerance is ≤ SRSS combination of RA, M&TE error, M&TEr). Different methods of calculating the as-found tolerance (including the inclusion of additional uncertainties (e.g., normal radiation effect, temperature effect between calibrations, capillary tubing error) may be acceptable. Alternate methods must result in an as-found tolerance that is small enough to detect abnormal channel performance. Any additional uncertainties included in the as-found tolerance calculation must be justified.

Verification that the measured setpoint is within the as-found tolerance is determined by calculating the difference between the current as-found value and the [Limiting Trip Setpoint] or by calculating the difference between the current as-found value and the previous as-left value. In order to use the as-found minus [LTSP] methodology, the as-left tolerance must be less than or equal to the SRSS combination of the RA, M&TE, and M&TE readability. The methodology used to determine the as-found and as-left tolerance must be stated in the document controlled under 10 CFR 50.59 referenced in Note 2, as described below.

For NUREG-1431 (Westinghouse plants), Technical Specifications Note 2 states:

"The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]~~[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]~~."

For NUREG-1430, 1432, 1433, and 1434, Note 2 states:

"The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel

performance. The Limiting Trip Setpoint and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]~~[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]~~."

Setpoint calculations assume that the instrument setpoint is left at the [NTSP or LTSP] within a specific as-left tolerance (e.g., 25 psig $\pm$ 2 psig). A tolerance is necessary because no device perfectly measures the process. Additionally, it is not possible to read and adjust a setting to an absolute value due to the readability and/or accuracy of the test instruments or the ability to adjust potentiometers. The as-left tolerance is normally as small as possible considering the tools and ALARA concerns of the calibration. The as-left tolerance is always considered in the setpoint calculation. Failure to set the actual plant trip setpoint to the [NTSP or LTSP] (or more conservative than the [NTSP or LTSP]), and within the as-left tolerance, would invalidate the assumptions in the setpoint calculation because any subsequent instrument drift would not start from the expected as-left setpoint.

The NRC Staff is concerned that some plants may have used as-left tolerances much larger than necessary for proper reading and adjustment of the channels. In this situation, the large tolerances could prevent or mask detection of instrument degradation or failure. However, large as-left tolerances do have the advantage of minimizing the number of times that a channel must be adjusted, and can provide a true indication of long term instrument performance if the results are trended using "as-found minus as-left" techniques.

Implementation of Note 2 may require some licensees to recalculate the as-left tolerance for some channels to ensure that realistic values are used that do not mask instrument performance.

During the process of checking the setpoint there are four possible results in best case to worst case order:

1. The setpoint is found within the as-left tolerance; the results are recorded in the procedure, and the Technical Specifications require no further action.

2. The setpoint is outside the as-left tolerance but within the as-found tolerance; the setpoint is reset to within the as-left tolerance, and the Technical Specifications require no further action.

3. The setpoint is found conservative with respect to the Allowable Value but outside the as-found tolerance. In this case the channel is OPERABLE, but degraded. The degraded condition will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP or LTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel is Operable and can be restored to service at the completion of the surveillance.

3. The two Notes are not normally applied to Functions and Surveillance Requirements which test only digital components. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

   Discussion: The two Notes do not apply to Functions and Surveillances which test only digital components. For purely digital components, such as actuation logic circuits, relays, and any other tests using a digital or on/off input, there is no expected change in result between surveillance performances and any test result other than the identified Technical Specification surveillance acceptance criteria would be considered inoperable. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

An evaluation resulted in the two Notes being applied to the Functions shown in Attachment A. Each licensee proposing to adopt this Traveler must review the list of Functions in Attachment A to confirm that the identified functions are consistent with their plant specific design. The two Notes are not required to be applied to any of the listed Functions which meet any of the exclusion criteria based on the plant specific design and analysis. In particular the licensee's evaluation must include all bypass, permissives and interlocks to verify they meet the exclusion criteria (for permissive that derives input from an adjustable device that is not tested as part of another function, the Notes would be applied). Note that Attachment A NUREG-1433, Specification 3.3.5-1 Function 1.d has been revised to indicate that if the valve is locked open, the Function can be removed from Technical Specifications. The TSTF-09-07 letter dated February 23, 2009 contained incorrect information for this Function.

The Allowable Value may still be the only value included in the Technical Specifications to indicate the least conservative value that the as-found setpoint may have during testing. In this case the [NTSP or LTSP] values must be contained in the facility FSAR or in any document incorporated into the facility FSAR by reference~~a document controlled under 10 CFR 50.59, such as the Technical Requirements Manual (or equivalent) or any document incorporated into the UFSAR, and~~ and the title of this document must be identified in Note 2 in order to satisfy the 10 CFR 50.36 requirement that the LSSS be in the Technical Specifications. Additionally, to ensure proper use of the Allowable Value, [Limiting Trip Setpoints], and [Nominal Trip Setpoints or field settings], the methodology for calculating the as-left and as-found tolerances, as discussed above, must also be included in the facility FSAR or in any document incorporated into the facility FSAR by reference ~~a document controlled under 10 CFR 50.59~~ and listed in the second Note.

For TS with a multiple column format which lists the [NTSP] (as shown as an option in NUREG-1431), the last sentence of Note2 is modified to remove the requirement that the [NTSP] be identified in the facility FSAR or in any document incorporated into the facility FSAR by reference. ~~a 10 CFR 50.59 controlled document~~. If the [NTSP] is specified in the Technical Specifications, any change to the [NTSP] requires prior NRC review and approval. As a result, it is not necessary for the [NTSP] to be specified in the facility FSAR or in any document incorporated into the facility FSAR by reference ~~a document controlled under 10 CFR 50.59~~. It will still be necessary to identify the methodologies used to determine the as-

found and the as-left tolerances in the facility FSAR or in any document incorporated into the facility FSAR by reference~~a document controlled under 10 CFR 50.59~~ and identify this document in Note 2.

Addition of the Definition of "Limiting Trip Setpoint" to the Bases

The term "[Limiting Trip Setpoint]" is added as generic terminology for the setpoint value calculated by means of the plant-specific setpoint methodology documented in the facility FSAR or in any document incorporated into the facility FSAR by reference ~~a document controlled under 10 CFR 50.59~~. The trip setpoint (field setting for Westinghouse NUREG, NTSP for all other NUREGs) may be more conservative than the Limiting or Nominal Trip Setpoint, but for the purpose of Technical Specifications compliance with 10 CFR 50.36, the plant-specific value for the LSSS must be in the specifications or the facility FSAR or in any document incorporated into the facility FSAR by reference ~~contained in a document controlled under 10 CFR 50.59~~.

Instead of referencing the title of the document that contains the [LTSPs] in Note 2, it is also acceptable to list the [LTSPs] directly in the Technical Specifications, and revise Note 2 to only identify the title of the document that describes the methodology for determining the as-found and as-left tolerances.

Option B

Option B requires the implementation of a Setpoint Control Program (SPC). The requirements for the SPC are stated in the Administrative Controls section of the Technical Specifications.

Implementation of a SPC allows the relocation of setpoints from the Technical Specifications to licensee control. The SPC also requires NRC approval of the setpoint methodology used to calculate the changes to the relocated setpoints. Lastly, the SPC includes the requirements to address the NRC's concern that are included as Notes in Option A.

The SCP proposed in the Traveler assumes that all setpoints from Specifications in Section 3.3, "Instrumentation," are relocated. An approved methodology must be listed in the Technical Specification program for each relocated setpoint and the licensee program must identify which methodology is used for each setpoint. Paragraph a. of the TS Setpoint Control Program lists the Specifications which are controlled by the program. This list includes those Specifications which include Functions that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A), and other Specifications in Section 3.3 with Functions having Allowable Values or Trip Setpoints that are relocated from the Specifications to licensee control. All applicable Section 3.3 Specifications are included in this Traveler. A licensee adopting this Traveler may choose to relocate the Allowable Values or Trip Setpoints from more or less Specifications.

The Surveillances which verify Allowable Values or Trip Setpoints in the Specifications for which Allowable Values or Trip Setpoints are relocated are revised to state that the

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.5.2	----------NOTE---------- 1. When an ESFAS channel is placed in an inoperable status solely for performance of this Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 8 hours, provided the remaining two channels of ESFAS instrumentation are OPERABLE or tripped. 2. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 3. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]. ---------- Perform CHANNEL FUNCTIONAL TEST.	31 days
SR 3.3.5.3	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance	

	around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].	
	Perform CHANNEL CALIBRATION.	[18] months
SR 3.3.5.4	Verify ESFAS RESPONSE TIME within limits.	[18] months on a STAGGERED TEST BASIS

Table 3.3.5-1 (page 1 of 1)
Engineered Safety Feature Actuation System Instrumentation

PARAMETER	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	ALLOWABLE VALUE
1. Reactor Coolant System Pressure - Low Setpoint (HPI Actuation, RB Isolation, RB Cooling, EDG Start)	≥ [1800] psig	≥ [1600] psig[1]
2. Reactor Coolant System Pressure - Low Low Setpoint (HPI Actuation, LPI Actuation, RB Isolation, RB Cooling)	≥ [900] psig	≥ [400] psig~~[(a),(b)]~~
3. Reactor Building (RB) Pressure - High Setpoint (HPI Actuation, LPI Actuation, RB Isolation, RB Cooling)	1,2,3,4	≤ [5] psig~~[(a),(b)]~~
4. Reactor Building Pressure - High High Setpoint (RB Spray Actuation)	1,2,3,4	≤ [30] psig~~[(a),(b)]~~

~~(a) INSERT 1~~

~~(b) INSERT 2~~

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor trip to protect against violating the core fuel design limits and the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Feature (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as the LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

BASES

BACKGROUND (continued)

The Allowable Values listed in Table 3.3.1-1 are based on the methodology described in "[Unit Specific Setpoint Methodology]" (Ref. 5), which incorporates all of the known uncertainties applicable for each channel. The magnitudes of those uncertainties are factored into the determination of each ~~trip setpoint.~~[LTSP]. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RPS Functions to preserve the SLs during all AOOs and mitigates the consequences of DBAs.

Each of the analyzed accidents and transients can be detected by one or more RPS Functions. The accident analysis contained in Reference 6 takes credit for most RPS trip Functions. Functions not specifically credited in the accident analysis were implicitly~~qualitatively~~ credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions are high RB pressure, high temperature, turbine trip, and loss of main feedwater. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions also serve as backups to Functions that were credited in the safety analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The LCO requires all instrumentation performing an RPS Function to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions. The four channels of each Function in Table 3.3.1-1 of the RPS instrumentation shall be OPERABLE during its specified Applicability to ensure that a reactor trip will be actuated if needed. Additionally, during shutdown bypass with any CRD trip breaker closed, the applicable RPS Functions must also be available. This ensures the capability to trip the withdrawn CONTROL RODS exists at all times that rod motion is possible. The trip Function channels specified in Table 3.3.1-1 are considered OPERABLE when all channel components necessary to provide a reactor trip are functional and in service for the required MODE or Other Specified Condition listed in Table 3.3.1-1.

Required Actions allow maintenance (protection channel) bypass of individual channels, but the bypass activates interlocks that prevent operation with a second channel bypass. Bypass effectively places the unit in a two-out-of-three logic configuration that can still initiate a reactor trip, even with a single failure within the system.

For most RPS Functions, the [LTSP] ensures that the departure from nucleate boiling (DNB) or the RCS Pressure SLs is not challenged. Cycle specific figures for use during operation are contained in the COLR.

BASES

ACTIONS (continued)

G.1

If the Required Action and associated Completion Time of Condition A or B are not met and Table 3.3.1-1 directs entry into Condition G, the unit must be brought to a MODE in which the specified RPS trip Function is not required to be OPERABLE. To achieve this status, THERMAL POWER must be reduced < [15]% RTP. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach [15]% RTP from full power conditions in an orderly manner without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for each RPS Function are identified by the SRs column of Table 3.3.1-1 for that Function. Most Functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and RPS RESPONSE TIME testing.

The SRs are modified by a Note. The [first] Note directs the reader to Table 3.3.1-1 to determine the correct SRs to perform for each RPS Function.

----------REVIEWER'S NOTE----------
The CHANNEL FUNCTIONAL TEST Frequencies are based on approved topical reports. For a licensee to use these times, the licensee must justify the Frequencies as required by the NRC Staff SER for the topical report.

---------- REVIEWER'S NOTE ----------
Notes c and d are applied to the setpoint verification Surveillances for each RPS Instrumentation Function in Table 3.3.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that the [LTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.5

A Note to the Surveillance indicates that neutron detectors are excluded from CHANNEL CALIBRATION. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

A CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the unit specific setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint analysis.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the resistance temperature detectors (RTD) sensors is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed sensing element.

The Frequency is justified by the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the ~~setpoint~~[LTSP] analysis.

SR 3.3.1 5 -is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that the [LTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.6

This SR verifies individual channel actuation response times are less than or equal to the maximum values assumed in the accident analysis.

Individual component response times are not modeled in the analyses. The analyses model the overall, or total, elapsed time from the point at which the parameter exceeds the analytical limit at the sensor to the point of rod insertion. Response time testing acceptance criteria for this unit are included in Reference 2.

A Note to the Surveillance indicates that neutron detectors are excluded from RPS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

Response time tests are conducted on an [18] month STAGGERED TEST BASIS. Testing of the final actuation devices~~channels~~, which make up the bulk of the response time, is included in the testing of each channel. Therefore, staggered testing results in response time verification of these ~~devices~~channels every [18] months. The [18] month Frequency is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit Parameters, to protect against violating core design limits and reactor coolant pressure boundary and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as the LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

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

The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note b of Table 3.3.5-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

Where the [LTSP] is not included in Table 3.3.5-1, the plant-specific location for the [LTSP] OR NTSP must be cited in Note b of Table 3.3.5-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC.

SURVEILLANCE REQUIREMENTS (continued)

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

Notes a and b are applied to the setpoint verification Surveillances for each ESFAS Function in Table 3.3.5-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

SR 3.3.5.1

Performance of the CHANNEL CHECK every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; therefore, it is key in verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside its limit. If the channels are normally off scale during times when surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Off scale low current loop channels are verified to be reading at the bottom of the range and not failed downscale.

SURVEILLANCE REQUIREMENTS (continued)

A CHANNEL FUNCTIONAL TEST is performed on each required ESFAS channel to ensure the entire channel will perform the intended functions. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. Any setpoint adjustment shall be consistent with the assumptions of the current unit specific setpoint analysis.

The Frequency of 31 days is based on unit operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given function in any 31 day interval is a rare event.

SR 3.3.5 2 is modified by two Notes as identified in Table 3.3.5-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that the [LTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.3

CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the unit specific setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint analysis.

This Frequency is justified by the assumption of an [18] month calibration interval to determine the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.3 is modified by two Notes as identified in Table 3.3.5-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that the [LTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.4

SR 3.3.5.4 ensures that the ESFAS actuation channel response times are less than or equal to the maximum times assumed in the accident analysis. The response time values are the maximum values assumed in

the safety analyses. Individual component response times are not modeled in the analyses. Response time testing acceptance criteria for this unit are included in Reference ~~1.~~2. The analyses model the overall or total elapsed time from the point at which the parameter exceeds the actuation setpoint value at the sensor to the point at which the end device is actuated. Thus, this SR encompasses the automatic actuation logic components covered by LCO 3.3.7 and the operation of the mechanical ESF components.

Response time tests are conducted on an [18] month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. Therefore, staggered testing results in response time verification of these ~~devices~~channels every [18] months. The 18 month test Frequency is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation but not channel failure are infrequent occurrences.

REFERENCES

1. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety Related Instrumentation."~~FSAR, Chapter [7].~~

2. FSAR, Chapter [7].

3. 10 CFR 50.49.

4. ~~3.~~ [Unit Specific Setpoint Methodology.]

5. ~~4.~~ FSAR, Chapter [14].

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for~~ "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective ~~devices...so chosen that automatic protective action~~actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a ~~safety~~protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The ~~trip~~ term "Limiting Trip Setpoint (LTSP)" is generic terminology for the calculated field setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

For most Westinghouse plants the term Nominal Trip Setpoint (NTSP) is used in place of the term LTSP, and NTSP will replace LTSP in the Bases descriptions. "Field setting" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated field setting. The as-found and as-left

BASES

ACTIONS (continued)

S.1 and S.2

Condition S applies to the RTB Undervoltage and Shunt Trip Mechanisms, or diverse trip features, in MODES 1 and 2. With one of the diverse trip features inoperable, it must be restored to an OPERABLE status within 48 hours or the unit must be placed in a MODE where the requirement does not apply. This is accomplished by placing the unit in MODE 3 within the next 6 hours (54 hours total time). The Completion Time of 6 hours is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. With the unit in MODE 3, ACTION C would apply to any inoperable RTB trip mechanism. The affected RTB shall not be bypassed while one of the diverse features is inoperable except for the time required to perform maintenance to one of the diverse features. The allowable time for performing maintenance of the diverse features is 2 hours for the reasons stated under Condition P.

The Completion Time of 48 hours for Required Action S.1 is reasonable considering that in this Condition there is one remaining diverse feature for the affected RTB, and one OPERABLE RTB capable of performing the safety function and given the low probability of an event occurring during this interval.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
In Table 3.3.1-1, Functions 11.a and 11.b were not included in the generic evaluations approved in either WCAP-10271, as supplemented, or WCAP-14333. In order to apply the WCAP-10271, as supplemented, and WCAP-14333 TS relaxations to plant specific Functions not evaluated generically, licensees must submit plant specific evaluations for NRC review and approval.

---------- REVIEWER'S NOTE ----------
Notes b and c are applied to the setpoint verification Surveillances for each RTS instrumentation Function in Table 3.3.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 184 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable COT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

Setpoints must be ~~within~~conservative with respect to the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as-found" [and "as-left"] values must also be recorded and reviewed for consistency with the assumptions of Reference 9.

SR 3.3.1.7 is modified by a Note that provides a 4 hours delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.1.7 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours this Surveillance must be performed prior to 4 hours after entry into MODE 3.

The Frequency of 184 days is justified in Reference 9.

SR 3.3.1.7 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action

Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.1-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.1-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by a Note that this test shall include verification that the P-6 and P-10 interlocks are in their required state for the existing unit condition. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable COT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 184 days of the Frequencies prior to reactor startup and four hours after reducing power below P-10 and P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source, intermediate and power range low instrument channels. The Frequency of [12] hours after reducing power below P-10 (applicable to intermediate and power range low channels) and 4 hours after reducing power below P-6 (applicable to source range channels) allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 92 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup and [12] and four hours after reducing power below P-10 or P-6, respectively. The MODE of Applicability for this surveillance is < P-10 for the power range low and intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 for more than [12] hours or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the time limit. [Twelve] hours and four hours are reasonable times to complete the required testing or place the unit in a MODE where this surveillance is no longer required. This test ensures that the NIS source, intermediate, and power range low channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-10 or < P-6) for periods > [12] and 4 hours, respectively. The Frequency of 184 days is justified in Reference 13.

SR 3.3.1.8 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will

continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.1-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.1-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.9

SR 3.3.1.9 is the performance of a TADOT and is performed every [92] days, as justified in Reference 9. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

The SR is modified by a Note that excludes verification of setpoints from the TADOT. Since this SR applies to RCP undervoltage and underfrequency relays, setpoint verification requires elaborate bench calibration and is accomplished during the CHANNEL CALIBRATION.

SR 3.3.1.10

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "as-found" values and the [NTSP or previous test "as-left" values] must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.1.10 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The

purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.1-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.1-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every [18] months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric and flux map performed above 15% RTP. The CHANNEL CALIBRATION for the source range and intermediate range neutron detectors consists of obtaining the detector plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. This Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1, and is not required for the NIS intermediate range detectors for entry into MODE 2, because the unit must be in at least MODE 2 to perform the test for the intermediate range detectors and MODE 1 for the power range detectors. The [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed on the [18] month Frequency.

SR 3.3.1.11 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.1-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.1-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

SR 3.3.1.12

SR 3.3.1.12 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every [18] months. This SR is modified by a Note stating that this test shall include verification of the RCS resistance temperature detector (RTD) bypass loop flow rate. Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the resistance temperature detectors (RTD) sensors is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed sensing element.

This test will verify the rate lag compensation for flow from the core to the RTDs.

The Frequency is justified by the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.1.12 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will

ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.1-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.1-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint (LTSP)" is generic terminology for the calculated field setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

For most Westinghouse plants the term Nominal Trip Setpoint (NTSP) is used in place of the term LTSP, and NTSP will replace LTSP in the Bases descriptions. "Field setting" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated field setting. The as-found and as-left tolerances will apply to the field setting implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note c of Table 3.3.2-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the

BASES

BACKGROUND (continued)

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. ~~4~~5). The actual number of channels required for each unit parameter is specified in Reference ~~2~~3.

~~Allowable Values~~[NTSPs] and ESFAS Setpoints [Allowable Values]

The trip setpoints used in the bistables are based on the analytical limits stated in Reference ~~2. The selection of these trip setpoints~~3. The calculation of the Nominal Trip Setpoints specified in Table 3.3.2-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. ~~5~~6), the Allowable Values specified in Table 3.3.2-1 in the accompanying LCO are conservative with respect to the analytical limits. A detailed description of the methodology used to calculate the Allowable Values and ESFAS ~~setpoints~~[NTSPs] including their explicit uncertainties, is provided in the plant specific setpoint methodology study (Ref. ~~6~~7) which incorporates all of the known uncertainties applicable to each channel. The as-left tolerance and as-found tolerance band methodology is provided in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]. The magnitudes of these uncertainties are factored into the determination of each ESFAS ~~setpoint~~[NTSP] and corresponding Allowable Value. The nominal ESFAS setpoint entered into the bistable is more conservative than that specified by the ~~Allowable Value~~[NTSP] to account for measurement errors detectable by the COT. The Allowable Value serves as the as-found Technical Specification OPERABILITY limit for the purpose of the COT. ~~One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.~~

The ~~ESFAS setpoints are~~[NTSP] is the ~~values~~value at which the bistables are set and is the expected value to be achieved during calibration. The ~~ESFAS setpoint~~[NTSP] value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a

BASES

BACKGROUND (continued)

Each SSPS train has a built in testing device~~channel~~ that can automatically test the decision logic matrix functions and the actuation ~~devices~~channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device~~channel~~ is semiautomatic to minimize testing time.

The actuation of ESF components is accomplished through master and slave relays. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays, which then cause actuation of the end devices.~~channels.~~ The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices~~channels~~ if their operation will not interfere with continued unit operation. For the latter case, actual component operation is prevented by the SLAVE RELAY TEST circuit, and slave relay contact operation is verified by a continuity check of the circuit containing the slave relay.

----------REVIEWER'S NOTE----------
No one unit ESFAS incorporates all of the Functions listed in Table 3.3.2-1. In some cases (e.g., Containment Pressure - High 3, Function 2.c), the Table reflects several different implementations of the same Function. Typically, only one of these implementations are used at any specific unit.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure - Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are implicitly~~qualitatively~~ credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. ~~3~~4).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.~~, (i.e. the value indicated is sufficiently close to the necessary value to ensure proper operation of the safety systems to turn the AOO).~~

The LCO requires all instrumentation performing an ESFAS Function, listed in Table 3.3.2-1 in the accompanying LCO, to be OPERABLE. ~~A~~The Allowable Value specified in Table 3.3.2-1 is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE ~~with a trip setpoint value outside its calibration tolerance band provided the trip~~if the as-found setpoint ~~"as-found" value does not exceed its associated Allowable Value and provided~~is within the as-found tolerance and is conservative with respect to the Allowable Value during the CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the [NTSP] by an amount [greater than or] equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel ([NTSP]) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint ~~"as-~~must be left~~" value is~~ adjusted to a value within the ~~calibration tolerance band of the Nominal Trip Setpoint.~~ as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance) and evaluating the channel.response If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance.

BASES

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
In Table 3.3.2-1, Functions 7.b and 7.c were not included in the generic evaluations approved in either WCAP-10271, as supplemented, or WCAP-14333. In order to apply the WCAP-10271, as supplemented, and WCAP-14333 TS relaxations to plant specific Functions not evaluated generically, licensees must submit plant specific evaluations for NRC review and approval.

---------- REVIEWER'S NOTE ----------
Notes b and c are applied to the setpoint verification Surveillances for all Engineered Safety Feature Actuation System (ESFAS) Instrumentation Function in Table 3.3.2-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The SRs for each ESFAS Function are identified by the SRs column of Table 3.3.2-1.

A Note has been added to the SR Table to clarify that Table 3.3.2-1 determines which SRs apply to which ESFAS Functions.

Note that each channel of process protection supplies both trains of the ESFAS. When testing channel I, train A and train B must be examined. Similarly, train A and train B must be examined when testing channel II, channel III, and channel IV (if applicable). The CHANNEL CALIBRATION and COTs are performed in a manner that is consistent with the

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.4

SR 3.3.2.4 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The time allowed for the testing (4 hours) is justified in Reference ~~11.~~12. The Frequency of 92 days is justified in Reference ~~9~~10.

SR 3.3.2.5

SR 3.3.2.5 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found ~~within~~conservative with respect to the Allowable Values specified in Table 3.3.~~1~~2-1. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable COT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

The difference between the current "as-found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as-found" and "as-left" values must also be recorded and reviewed for consistency with the assumptions of Reference ~~6~~7.

The Frequency of 184 days is justified in Reference ~~11~~12.

SR 3.3.2.5 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel

performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.8

SR 3.3.2.8 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and AFW pump start on trip of all MFW pumps. It is performed every [18] months. Each Manual Actuation Function is tested up to, and including, the master relay coils. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.). The Frequency is adequate, based on industry operating experience and is consistent with the typical refueling cycle.

SR 3.3.2.8 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation Functions. The manual initiation Functions have no associated setpoints.

SR 3.3.2.9

SR 3.3.2.9 is the performance of a CHANNEL CALIBRATION.

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "as-found" values and the previous test "as-left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of [18] months is based on the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.2.9 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be

returned to within the as-left tolerance of the [NTSP]. Where a setpoint more conservative than the [NTSP] is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [NTSP], then the channel shall be declared inoperable.

----------REVIEWER'S NOTE----------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

~~The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.5.1	Perform a CHANNEL CHECK of each ESFAS channel.	12 hours
SR 3.3.5.2	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]. ----------	
	Perform a CHANNEL FUNCTIONAL TEST of each ESFAS channel.	92 days
SR 3.3.5.3	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are	

SURVEILLANCE		FREQUENCY
	acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].	
	Perform a CHANNEL CALIBRATION of each ESFAS channel, including bypass removal functions.	[18] months
SR 3.3.5.4	Verify ESF RESPONSE TIME is within limits.	[18] months on a STAGGERED TEST BASIS
SR 3.3.5.5	Perform a CHANNEL FUNCTIONAL TEST on each automatic bypass removal channel.	Once within 92 days prior to each reactor startup

Table 3.3.5-1 (page 1 of 2)
Engineered Safety Features Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	ALLOWABLE VALUE
1. Safety Injection Actuation Signal[a]		
a. Containment Pressure - High	1,2,3	≤ [3.14] psig[~~(b) (c)~~]
b. Pressurizer Pressure - Low[b~~d~~d]	1,2,3	≥ [1763] psia[~~(b) (c)~~]
2. Containment Spray Actuation Signal		
a. Containment Pressure – High High	1,2,3	≤ [16.83] psia[~~(b) (c)~~]
b. Automatic SIAS	1,2,3	NA
3. Containment Isolation Actuation Signal		
a. Containment Pressure – High	1,2,3	≤ [3.14] psig[~~(b) (c)~~]
b. Pressurizer Pressure - Low[~~d~~~~d~~b]	1,2,3	≥ [1763] psia[~~(b) (c)~~]
4. Main Steam Isolation Signal		
a. Steam Generator Pressure - Low[c~~e~~]	1,2[d~~f~~],3[d~~f~~]	≥ [711] psig[~~(b) (c)~~]
b. Containment Pressure – High	1,2[d~~f~~],3[d~~f~~]	≤ [3.14] psig[~~(b) (c)~~]
5. Recirculation Actuation Signal		
a. Refueling Water Storage Tank Level – Low	1,2,3	[≥ 17.73 and ≤ 19.27]%[~~(b) (c)~~]

(a) Automatic SIAS also initiates a Containment Cooling Actuation Signal (CCAS).

~~(b) INSERT 1~~

~~(c) INSERT 2~~

(b~~d~~) The setpoint may be decreased to a minimum value of [300] psia, as pressurizer pressure is reduced, provided the margin between pressurizer pressure and the setpoint is maintained ≤ [400] psia. Trips may be bypassed when pressurizer pressure is < [400] psia. Bypass shall be automatically removed when pressurizer pressure is ≥ [500] psia. The setpoint shall be automatically increased to the normal setpoint as pressurizer pressure is increased.

(~~e~~c) The setpoint may be decreased as steam pressure is reduced, provided the margin between steam pressure and the setpoint is maintained ≤ [200] psig. The setpoint shall be automatically increased to the normal setpoint as steam pressure is increased.

(d~~f~~) The Main Steam Isolation Signal (MSIS) Function (Steam Generator Pressure - Low and Containment Pressure - High signals) is not required to be OPERABLE when all associated valves isolated by the MSIS Function are closed and [de-activated].

Table 3.3.5-1 (page 2 of 2)
Engineered Safety Features Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	ALLOWABLE VALUE
6. Emergency Feedwater Actuation Signal SG #1 (EFAS-1)		
a. Steam Generator Level - Low	1,2,3	≥ [24.23]%~~(b) (c)~~
b. SG Pressure Difference - High	1,2,3	≤ [66.25] psid~~(b) (c)~~
[c. Steam Generator Pressure - Low	1,2,3	≥ [711] psig]~~(b) (c)~~
7. Emergency Feedwater Actuation Signal SG #2 (EFAS-2)		
a. Steam Generator Level - Low	1,2,3	≥ [24.23]%~~(b) (c)~~
b. SG Pressure Difference - High	1,2,3	≤ [66.25] psid~~(b) (c)~~
[c. Steam Generator Pressure – Low	1,2,3	≥ [711] psig]~~(b) (c)~~

~~(b) INSERT 1~~

~~(c) INSERT 2~~

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Analog)

BASES

BACKGROUND

The Reactor Protective System (RPS) initiates a reactor trip to protect against violating the core specified acceptable fuel design limits and breaching the reactor coolant pressure boundary (RCPB) during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Features (ESF) systems in mitigating accidents.

The protection and monitoring systems have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include~~contain~~ LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for ~~instrument loop~~channel uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

BASES

ACTIONS (continued)

G.1

Condition G is entered when the Required Action and associated Completion Time of Conditions A, B, C, D, E, or F are not met.

If the Required Actions associated with these Conditions cannot be completed within the required Completion Times, the reactor must be brought to a MODE in which the Required Actions do not apply. The allowed Completion Time of 6 hours to be in MODE 3 is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular RPS Function are found in the SR column of Table 3.3.1-1 for that Function. Most Functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

----------REVIEWER'S NOTE----------
In order for a plant to take credit for topical reports as the basis for justifying Frequencies, topical reports must be supported by an NRC staff SER that establishes the acceptability of each topical report for that plant (Ref. 9).

---------- REVIEWER'S NOTE ----------
Notes a and b are applied to the setpoint verification Surveillances for each RPS Instrumentation – Operating (Analog) Function in Table 3.3.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where

BASES

SURVEILLANCE REQUIREMENTS (continued)

Bistable Tests

The bistable setpoint must be found to trip ~~within~~conservative with respect to the Allowable Values specified in the LCO and left set consistent with the assumptions of the plant specific setpoint analysis (Ref. 7). As-found and as-left values must also be recorded and reviewed for consistency with the assumptions of the frequency extension analysis. The requirements for this review are outlined in Reference 10.

A test signal is superimposed on the input in one channel at a time to verify that the bistable trips within the specified tolerance around the setpoint. This is done with the affected RPS channel trip channel bypassed. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint analysis.

SR 3.3.1.4 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.5

A CHANNEL CALIBRATION of the excore power range channels every 92 days ensures that the channels are reading accurately and within tolerance. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the frequency extension analysis. The requirements for this review are outlined in Reference [10].

A Note is added stating that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2) and the monthly linear subchannel gain check (SR 3.3.1.3). In addition, associated control room indications are continuously monitored by the operators.

SR 3.3.1.5 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

The Frequency of 92 days is acceptable, based on plant operating experience, and takes into account indications and alarms available to the operator in the control room.

SR 3.3.1.6

A CHANNEL FUNCTIONAL TEST on the Loss of Load and Power Rate of Change channels is performed prior to a reactor startup to ensure the entire channel will perform its intended function if required. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Loss of Load pressure sensor cannot be tested during reactor operation without closing the high pressure TSV, which would result in a turbine trip or reactor trip. The Power Rate of Change - High trip Function is required during startup operation and is bypassed when shut down or > 15% RTP.

SR 3.3.1.6 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable,

will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

The Frequency is based upon the assumption of an 18 month calibration interval for the determination of the magnitude of equipment drift.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Surveillance is modified by a Note to indicate that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2) and the monthly linear subchannel gain check (SR 3.3.1.3).

SR 3.3.1.9

This SR ensures that the RPS RESPONSE TIMES are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the RTCBs open. Response times are conducted on an [18] month STAGGERED TEST BASIS. This results in the interval between successive surveillances of a given channel of n x 18 months, where n is the number of channels in the function. The Frequency of

[18] months is based upon operating experience, which has shown that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Also, response times cannot be determined at power, since equipment operation is required. Testing may be performed in one measurement or in overlapping segments, with verification that all components are tested.

----------REVIEWER'S NOTE----------
Applicable portions of the following TS Bases are applicable to plants adopting CEOG Topical Report CE NPSD-1167-1, "Elimination of Pressure Sensor Response Time Testing Requirements."

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 11) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

BASES

SURVEILLANCE REQUIREMENTS (continued)

A Note is added to indicate that the neutron detectors are excluded from RPS RESPONSE TIME testing because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2).

REFERENCES

1. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation."
2. 10 CFR 50, Appendix A, GDC 21.
3. 10 CFR 100.
4. IEEE Standard 279-1971, April 5, 1972.
5. FSAR, Chapter [14].
6. 10 CFR 50.49.
7. "Plant Protection System Selection of Trip Setpoint Values."
8. FSAR, Section [7.2].
9. NRC Safety Evaluation Report, [Date].
10. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989.
11. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

B 3.3 INSTRUMENTATION

B 3.3.4 Engineered Safety Features Actuation System (ESFAS) Instrumentation (Analog)

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note b of Table 3.3.4-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the

Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

Where the [LTSP] is not included in Table 3.3.4-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.4-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~ .

BASES

BACKGROUND (continued)

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.4-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. As such, the [LTSP] meets the definition of a LSSS (Ref. 1).

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE because it would have performed its safety function and the only corrective action required would be to reset the

channel within the established as-left tolerance around the [LTSP] to account for further drift during the next surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in

BASES

BACKGROUND (continued)

In order to take full advantage of the four channel design, adequate channel to channel independence must be demonstrated, and approved by the NRC staff. Plants not currently licensed ~~as~~ to credit four channel independence that may desire this capability must have approval of the NRC staff documented by an NRC Safety Evaluation Report (Ref. ~~3~~5). Adequate channel to channel independence includes physical and electrical independence of each channel from the others. Furthermore, each channel must be energized from separate inverters and station batteries. Plants not demonstrating four channel independence may operate in a two-out-of-three logic configuration for 48 hours.

Since no single failure will either cause or prevent a protective system actuation and no protective channel feeds a control channel, this arrangement meets the requirements of IEEE Standard 79-1971 (Ref. 4~~5~~6).

Bistable Trip Units

Bistable trip units receive an analog input from the measurement channels, compare the analog input to trip setpoints, and provide contact output to the Actuation Logic. They also provide local trip indication and remote annunciation.

There are four channels of bistables, designated A through D, for each ESF Function, one for each measurement channel. In cases where two ESF Functions share the same input and trip setpoint (e.g., containment pressure input to CSAS, CIAS, and SIAS and a Pressurizer Pressure - Low input to the RPS and SIAS), the same bistable may be used to satisfy both Functions.

The trip setpoints and Allowable Values used in the bistables are based on the analytical limits stated in Reference ~~5. The selection of these trip setpoints~~7. The selection of these trip setpoints~~calculation of the Limiting Trip Setpoint specified in Table 3.3.4-1~~ is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment effects, for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. ~~6~~8), Allowable Values specified in Table 3.3.4-1, in the accompanying LCO, are conservatively adjusted with respect to the analytical limits. A detailed description of the method used to calculate the trip setpoints, including their explicit uncertainties, is provided in the "Plant Protection System Selection of Trip Setpoint Values" (Ref. ~~7~~9). The actual ~~nominal~~ trip

BASES

BACKGROUND (continued)

setpoint entered into the bistable is normally still more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. One example of such a change in measurement error is drift during the interval between surveillances.
~~If the measured setpoint does not exceedis conservative with respect to the Allowable Value, the bistable is considered OPERABLE.~~

~~Setpoints in accordance with~~The [LTSP] is the value at which the bistable is set and is the expected value to be achieved during calibration. The [LTSP] value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties.

[Limiting Trip Setpoints], in conjunction with the use of as-found and as-left tolerances, consistent with the requirements of the Allowable Value will ensure that Safety Limits of Chapter 2.0, "SAFETY LIMITS (SLs)," are not violated during anticipated operational occurrences (AOOs) and that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed.

Note that in the accompanying LCO 3.3.4, the Allowable Values of Table 3.3.4-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION or CHANNEL FUNCTIONAL TEST.

ESFAS Logic

It is possible to change the two-out-of-four ESFAS logic to a two-out-of-three logic for a given input parameter in one channel at a time by disabling one channel input to the logic. Thus, the bistables will function normally, producing normal trip indication and annunciation, but ESFAS actuation will not occur since the bypassed channel is effectively removed from the coincidence logic. Trip channel bypassing can be simultaneously performed on any number of parameters in any number of channels, providing each parameter is bypassed in only one channel at a time. At some plants an interlock prevents simultaneous trip channel bypassing of the same parameter in more than one channel. Trip channel bypassing is normally employed during maintenance or testing.

ESFAS Logic is addressed in LCO 3.3.5.

APPLICABLE SAFETY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal

BASES

ACTIONS (continued)

F.1 and F.2

If the Required Actions and associated Completion Times of Condition A, B, C, D, or E are not met, 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 and to MODE 4 within [12] hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular ESFAS Function are found in the SRs column of Table 3.3.4-1 for that Function. Most functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

----------REVIEWER'S NOTE----------
In order for a unit to take credit for topical reports as the basis for justifying Frequencies, topical reports should be supported by an NRC staff Safety Evaluation Report that establishes the acceptability of each topical report for that unit.

---------- REVIEWER'S NOTE ----------
Notes a and b are applied to the setpoint verification Surveillances for each ESFAS Instrumentation (Analog) Function in Table 3.3.4-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

BASES

SURVEILLANCE REQUIREMENTS (continued)

times when Surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Offscale low current loop channels are verified to be reading at the bottom of the range and not failed downscale.

The Frequency of about once every shift is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of CHANNEL OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.4.2

A CHANNEL FUNCTIONAL TEST is performed every [92] days to ensure the entire channel will perform its intended function when needed. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

The CHANNEL FUNCTIONAL TEST tests the individual sensor subsystems using an analog test input to each bistable.

A test signal is superimposed on the input in one channel at a time to verify that the bistable trips within the specified tolerance around the setpoint. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint analysis.

The as-found [and as-left] values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [~~8~~10].

SR 3.3.4.2 is modified by two Notes as identified in Table 3.3.4-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and

the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency is based upon the assumption of an [18] month calibration interval for the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.4.4 is modified by two Notes as identified in Table 3.3.4-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.4.5

This Surveillance ensures that the train actuation response times are the maximum values assumed in the safety analyses. Individual component response times are not modeled in the analyses. The analysis models the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Digital)

BASES

BACKGROUND

The ~~RPS~~Reactor Protective System (RPS) initiates a reactor trip to protect against violating the core specified acceptable fuel design limits and breaching the reactor coolant pressure boundary (RCPB) during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Features (ESF) systems in mitigating accidents.

The protection and monitoring systems have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include~~contain~~ LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for ~~instrument loop~~channel uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note b of Table 3.3.1-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

Where the [LTSP] is not included in Table 3.3.1-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance. –~~.

The [Limiting Trip Setpoint (LTSP] specified in Table 3.3.1-1 is a predetermined setting for a protective ~~device~~channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [LTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[LTSP] ensures that SLs are not exceeded. As such, the ~~trip setpoint~~[LTSP] meets the definition of ~~an~~a LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

ACTIONS (continued)

If the Required Actions associated with these Conditions cannot be completed within the required Completion Time, the reactor must be brought to a MODE where the Required Actions do not apply. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular RPS Function are found in the SR column of Table 3.3.1-1 for that Function. Most Functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

----------REVIEWER'S NOTE----------
In order for a plant to take credit for topical reports as the basis for justifying Frequencies, topical reports must be supported by an NRC staff SER that establishes the acceptability of each topical report for that unit.

---------- REVIEWER'S NOTE ----------
Notes a and b are applied to the setpoint verification Surveillances for each RPS Instrumentation – Operating (Digital) Function in Table 3.3.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

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SR 3.3.1.1

Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.8

A Note indicates that neutron detectors are excluded from CHANNEL CALIBRATION. A CHANNEL CALIBRATION of the power range neutron flux channels every 92 days ensures that the channels are reading accurately and within tolerance (Ref. 10). The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.

The as-found and as-left values must also be recorded and reviewed for consistency with the assumptions of the interval between surveillance interval extension analysis. The requirements for this review are outlined in Reference 10. Operating experience has shown this Frequency to be satisfactory. The detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4) and the monthly linear subchannel gain check (SR 3.3.1.6). In addition, the associated control room indications are monitored by the operators.

SR 3.3.1.8 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting

within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

[SR 3.3.1.9

The characteristics and Bases for this Surveillance are as described for SR 3.3.1.7. This Surveillance differs from SR 3.3.1.7 only in that the CHANNEL FUNCTIONAL TEST on the Loss of Load functional unit is only required above 55% RTP. When above 55% and the trip is in effect, the CHANNEL FUNCTIONAL TEST will ensure the channel will perform its equipment protective function if needed. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Note allowing 2 hours after reaching 55% RTP is necessary for Surveillance performance. This Surveillance cannot be performed below 55% RTP, since the trip is bypassed.]

SR 3.3.1.9 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is

maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.10

SR 3.3.1.10 is the performance of a CHANNEL CALIBRATION every [18] months.

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.

The as-found and as-left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [10].

The Frequency is based upon the assumption of an [18] month calibration interval for the determination of the magnitude of equipment drift in the setpoint analysis as well as operating experience and consistency with the typical [18] month fuel cycle.

The Surveillance is modified by a Note to indicate that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4) and the monthly linear subchannel gain check (SR 3.3.1.6).

SR 3.3.1.10 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance

procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.11

Every [18] months, a CHANNEL FUNCTIONAL TEST is performed on the CPCs. The CHANNEL FUNCTIONAL TEST shall include the injection of a signal as close to the sensors as practicable to verify OPERABILITY including alarm and trip Functions. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The basis for the [18] month Frequency is that the CPCs perform a continuous self monitoring function that eliminates the need for frequent CHANNEL FUNCTIONAL TESTS. This CHANNEL FUNCTIONAL TEST essentially validates the self monitoring function and checks for a small set of failure modes that are undetectable by the self monitoring function. Operating experience has shown that undetected CPC or CEAC failures do not occur in any given [18] month interval.

SR 3.3.1.11 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.12

The three excore detectors used by each CPC channel for axial flux distribution information are far enough from the core to be exposed to flux from all heights in the core, although it is desired that they only read their

BASES

SURVEILLANCE REQUIREMENTS (continued)

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 11) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

A Note is added to indicate that the neutron detectors are excluded from RPS RESPONSE TIME testing because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4).

REFERENCES

1. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation."
2. 10 CFR 50, Appendix A, GDC 21.
3. 10 CFR 100.
4. NRC Safety Evaluation Report.
5. IEEE Standard 279-1971, April 5, 1972.
6. FSAR, Chapter [14].
7. 10 CFR 50.49.
8. "Plant Protection System Selection of Trip Setpoint Values."
9. FSAR, Section [7.2].
10. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989.
11. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

BASES

SURVEILLANCE REQUIREMENTS (continued)

Agreement criteria are determined by the plant staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limits.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.3.2

The CEAC autorestart count is checked every 12 hours to monitor the CPC and CEAC for normal operation. If three or more autorestarts of a nonbypassed CPC occur within a 12 hour period, the CPC may not be completely reliable. Therefore, the Required Action of Condition D must be performed. The Frequency is based on operating experience that demonstrates the rarity of more than one channel failing within the same 12 hour interval.

SR 3.3.3.3

A CHANNEL FUNCTIONAL TEST on each CEAC channel is performed every 92 days to ensure the entire channel will perform its intended function when needed. The quarterly CHANNEL FUNCTIONAL TEST is performed using test software. The Frequency of 92 days is based on the reliability analysis presented in topical report CEN-327, "RPS/ESFAS Extended Test Interval Evaluation" (Ref. 5). A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.3.4

SR 3.3.3.4 is the performance of a CHANNEL CALIBRATION every [18] months.

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive surveillances. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.
~~The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [5].~~

The Frequency is based upon the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis and includes operating experience and consistency with the typical [18] month fuel cycle.

SR 3.3.3.5

Every [18] months, a CHANNEL FUNCTIONAL TEST is performed on the CEACs. The CHANNEL FUNCTIONAL TEST shall include the injection of a signal as close to the sensors as practicable to verify OPERABILITY, including alarm and trip Functions. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The basis for the [18] month Frequency is that the CEACs perform a continuous self monitoring function that eliminates the need for frequent CHANNEL FUNCTIONAL TESTS. This CHANNEL FUNCTIONAL TEST essentially validates the self monitoring function and checks for a small

B 3.3 INSTRUMENTATION

B 3.3.5 Engineered Safety Features Actuation System (ESFAS) Instrumentation (Digital)

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and ensures acceptable consequences during accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for channel uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note c of Table 3.3.5-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the

Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

Where the [LTSP] is not included in Table 3.3.5-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note c of Table 3.3.5-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.5-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. As such, the [LTSP] meets the definition of a LSSS (Ref. 1).

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE because it would have performed its safety function and the only corrective action required would be to reset the channel within the established as-left tolerance around the [LTSP] to account for further drift during the next surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

BASES

BACKGROUND (continued)

The trip setpoints and Allowable Values used in the bistables are based on the analytical limits stated in Reference ~~5. The selection of these trip setpoints~~7. The selection of these trip setpoints~~calculation of the Limiting Trip Setpoints specified in Table 3.3.5-1~~ is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment effects, for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. ~~6~~8), Allowable Values specified in Table 3.3.5-1, in the accompanying LCO, are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the trip setpoints, including their explicit uncertainties, is provided in the "Plant Protection System Selection of Trip Setpoint Values" (Ref. ~~7~~9). The actual ~~nominal~~ trip setpoint entered into the bistable is normally still more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. ~~A channel is inoperable if its actual trip~~ One example of such a change in measurement error is drift during the interval between surveillances.
~~If the measured setpoint is within the as-found tolerance and is conservative with respect to the Allowable Value, the bistable is considered OPERABLE.~~

The [LTSP] is the value at which the bistable is set and is the expected value to be achieved during calibration. The [LTSP] value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties.

[Limiting Trip Setpoints], in conjunction with the use of as-found and as-left tolerances, consistent with the requirements of ~~setpoint is not within its required Allowable Value.~~

~~Setpoints in accordance with~~ the Allowable Value will ensure that Safety Limits of LCO Section 2.0, "Safety Limits," are not violated during AOOs and the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed.

Note that in LCO 3.3.5, the Allowable Values of Table 3.3.5-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION or CHANNEL FUNCTIONAL TEST.

Functional testing of the ESFAS, from the bistable input through the opening of initiation relay contacts in the ESFAS Actuation Logic, can be

determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.3

CHANNEL CALIBRATION is a complete check of the instrument channel including the detector and the bypass removal functions. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive surveillances. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [~~9~~11].

The [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

SR 3.3.5.3 functions are modified by two Notes as identified in Table 3.3.5-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility

FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.4

This Surveillance ensures that the train actuation response times are within the maximum values assumed in the safety analyses.

Response time testing acceptance criteria are included in Reference ~~10~~12.

----------REVIEWER'S NOTE----------
Applicable portions of the following TS Bases are applicable to plants adopting CEOG Topical Report CE NPSD-1167-1, "Elimination of Pressure Sensor Response Time Testing Requirements."

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A,

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.4.1.2	----------NOTES---------- 1. For the TCV Function, if the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. For the TCV Function, the instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference]. ---------- [Calibrate the trip units.	[92] days]
SR 3.3.4.1.3	----------NOTES---------- 1. For the TCV Function, if the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. For the TCV Function, the instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left	[18] months

	tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference]. ---------- Perform CHANNEL CALIBRATION. The Allowable Values shall be: a. TSV - Closure: ≤ [10]% closed and b. TCV Fast Closure, Trip Oil Pressure - Low: ≥ [600] psig.	
SR 3.3.4.1.4	Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.	[18] months
SR 3.3.4.1.5	Verify TSV - Closure and TCV Fast Closure, Trip Oil Pressure - Low Functions are not bypassed when THERMAL POWER is ≥ [30]% RTP.	[18] months
SR 3.3.4.1.6	----------NOTE---------- Breaker [interruption] time may be assumed from the most recent performance of SR 3.3.4.1.7. ---------- Verify the EOC-RPT SYSTEM RESPONSE TIME is within limits.	[18] months on a STAGGERED TEST BASIS
SR 3.3.4.1.7	Determine RPT breaker [interruption] time.	60 months

B 3.3 INSTRUMENTATION

B 3.3.1.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limits, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS) and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a ~~safety~~protective action is initiated, as established by the safety analysis, to ensure that a safety limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

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

The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note b of Table 3.3.1.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.1.1-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.1.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~ .

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.1.1-1 is a predetermined setting for a ~~protective device~~protection channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [LTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[LTSP] ensures that SLs are not exceeded. ~~As such~~Therefore, the ~~trip setpoint~~[LTSP] meets the definition of an LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." ~~For automatic protective devices,~~Relying solely on the ~~required safety function is to ensure that a SL is not exceeded and therefore the LSSS as defined by 10 CFR 50.36 is the same as the OPERABILITY limit for these devices. However, use of the trip setpoint~~[LTSP] to define OPERABILITY in Technical Specifications ~~and its corresponding designation as the LSSS required by 10 CFR 50.36~~ would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a ~~protective device~~protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic ~~protective device~~protection channel with a setting that has been found to be different from the ~~trip~~

The OPERABILITY of the RPS is dependent on the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.1.1-1. Each Function must have a required number of OPERABLE channels per RPS trip system, with their setpoints set within the ~~specified Allowable Value,~~setting tolerance of the [LTSPs], where appropriate. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. Each channel must also respond within its assumed response time.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Allowable Values for RPS Instrumentation Functions are specified ~~for each RPS Function specified~~ in ~~the~~ Table~~. Nominal trip setpoints~~ 3.3.1.1-1. [Limiting Trip Setpoints] and the methodologies for calculation of the as-left and as-found tolerances are ~~specified~~described in ~~the setpoint calculations.~~[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]. The ~~nominal setpoints~~[LTSPs] are selected to ensure that the actual setpoints ~~do not exceed the Allowable Value~~remain conservative with respect to the as-found tolerance band between successive CHANNEL CALIBRATIONS. ~~Operation with a~~ After each calibration the trip setpoint ~~less conservative than the nominal trip setpoint, but~~shall be left within ~~its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.~~the as-left band around the [LTSP].

~~Trip setpoints~~[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined accounting for the remaining instrument errors (e.g., drift). The ~~trip setpoints~~[LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The OPERABILITY of scram pilot valves and associated solenoids, backup scram valves, and SDV valves, described in the Background section, are not addressed by this LCO.

The individual Functions are required to be OPERABLE in the MODES specified in the table, which may require an RPS trip to mitigate the

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

Notes a and b are applied to the setpoint verification Surveillances for each RTS instrumentation Function in Table 3.3.1.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

As noted at the beginning of the SRs, the SRs for each RPS ~~instrumentation~~instrument Function are located in the SRs column of Table 3.3.1.1-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains RPS trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Ref. 4) assumption of the average time required to perform channel Surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

SR 3.3.1.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.7 and SR 3.3.1.1.10

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical ~~Specification~~Specifications and non-Technical ~~Specification~~Specifications tests at least once per refueling interval with applicable extensions. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology. The 92 day Frequency of SR 3.3.1.1.7 is based on the reliability analysis of Reference 10.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.7 for Function 3.3.1.1-1.2.d is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document

incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.8

~~Calibration~~The calibation of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.1.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is ~~not beyond~~conservative with respect to the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to ~~be equal to or more conservative than~~the [LTSP] within the as-left tolerance as accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference 10.

Numerous SR 3.3.1.1.8 functions are modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled~~

~~under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.12

The Average Power Range Monitor Flow Biased Simulated Thermal Power - High Function uses an electronic filter circuit to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This filter circuit is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. The Surveillance filter time constant must be verified to be ≤ 7 seconds to ensure that the channel is accurately reflecting the desired parameter.

The Frequency of 18 months is based on engineering judgment considering the reliability of the components.

SR 3.3.1.1.12 for Function 3.3.1.1-1.2.b is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be

declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.13

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The functional testing of control rods (LCO 3.1.3), and SDV vent and drain valves (LCO 3.1.8), overlaps this Surveillance to provide complete testing of the assumed safety function.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.14

This SR ensures that scrams initiated from the Turbine Stop Valve - Closure and Turbine Control Valve Fast Closure, Trip Oil Pressure - Low Functions will not be inadvertently bypassed when THERMAL POWER is ≥ 30% RTP. This involves calibration of the bypass channels. Adequate margins for the instrument setpoint methodologies are incorporated into the actual setpoint. Because main turbine bypass flow can affect this setpoint nonconservatively (THERMAL POWER is derived from turbine first stage pressure), the main turbine bypass valves must remain closed at THERMAL POWER ≥ 30% RTP to ensure that the calibration remains valid.

If any bypass channel's setpoint is nonconservative (i.e., the Functions are bypassed at ≥ 30% RTP, either due to open main turbine bypass valve(s) or other reasons), then the affected Turbine Stop Valve - Closure and Turbine Control Valve Fast Closure, Trip Oil Pressure - Low Functions are considered inoperable. Alternatively, the bypass channel can be placed in the conservative condition (nonbypass). If placed in the nonbypass condition, this SR is met and the channel is considered OPERABLE.

B 3.3 INSTRUMENTATION

B 3.3.2.1 Control Rod Block Instrumentation

BASES

BACKGROUND

Control rods provide the primary means for control of reactivity changes. Control rod block instrumentation includes channel sensors, logic circuitry, switches, and relays that are designed to ensure that specified fuel design limits are not exceeded for postulated transients and accidents. During high power operation, the rod block monitor (RBM) provides protection for control rod withdrawal error events. During low power operations, control rod blocks from the rod worth minimizer (RWM) enforce specific control rod sequences designed to mitigate the consequences of the control rod drop accident (CRDA). During shutdown conditions, control rod blocks from the Reactor Mode Switch - Shutdown Position Function ensure that all control rods remain inserted to prevent inadvertent criticalities.

The protection and monitoring functions of the control rod block instrumentation has been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note c of Table 3.3.2.1-1 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.2.1-1, the plant-specific location for the [LTSP] or [NTSP] must be cited in Note c of Table 3.3.2.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.2.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Values specified in Table 3.3.2.1-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Allowable Values are specified for each Rod Block Function specified in SR 3.3.2.1.7, [[Limiting Trip Setpoints] and the methodologies for calculation of the as-left and as-found tolerances are described in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]. The [LTSP]s are selected to ensure that the actual setpoints remain conservative with respect to the as-found tolerance band between successive CHANNEL CALIBRATIONS. After each calibration the trip setpoint shall be left within the as-left band around the [LTSP].

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined accounting for the remaining instrument errors (e.g., drift). The [LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. Rod Block Monitor

The RBM is designed to prevent violation of the MCPR SL and the cladding 1% plastic strain fuel design limit that may result from a single control rod withdrawal error (RWE) event. The analytical methods and assumptions used in evaluating the RWE event are summarized in Reference ~~3.~~4. A statistical analysis of RWE events was performed to determine the RBM response for both channels for each event. From these responses, the fuel thermal performance as a function of RBM Allowable Value was determined. The Allowable Values are chosen as a function of power level. Based on the specified Allowable Values, operating limits are established.

The RBM Function satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

ACTIONS (continued)

E.1 and E.2

With one Reactor Mode Switch - Shutdown Position control rod withdrawal block channel inoperable, the remaining OPERABLE channel is adequate to perform the control rod withdrawal block function. However, since the Required Actions are consistent with the normal action of an OPERABLE Reactor Mode Switch - Shutdown Position Function (i.e., maintaining all control rods inserted), there is no distinction between having one or two channels inoperable.

In both cases (one or both channels inoperable), suspending all control rod withdrawal and initiating action to fully insert all insertable control rods in core cells containing one or more fuel assemblies will ensure that the core is subcritical with adequate SDM ensured by LCO 3.1.1. Control rods in core cells containing no fuel assemblies do not affect the reactivity of the core and are therefore not required to be inserted. Action must continue until all insertable control rods in core cells containing one or more fuel assemblies are fully inserted.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

---------- REVIEWER'S NOTE ----------
Notes b and c are applied to the setpoint verification Surveillances for the Control Rod Block Instrumentation Functions in Table 3.3.2.1-1unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where

requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

B 3.3 INSTRUMENTATION

B 3.3.4.1 End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation

BASES

BACKGROUND

The EOC-RPT instrumentation initiates a recirculation pump trip (RPT) to reduce the peak reactor pressure and power resulting from turbine trip or generator load rejection transients to provide additional margin to core thermal MCPR Safety Limits (SLs).

The need for the additional negative reactivity in excess of that normally inserted on a scram reflects end of cycle reactivity considerations. Flux shapes at the end of cycle are such that the control rods may not be able to ensure that thermal limits are maintained by inserting sufficient negative reactivity during the first few feet of rod travel upon a scram caused by Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure - Low or Turbine Stop Valve (TSV) - Closure. The physical phenomenon involved is that the void reactivity feedback due to a pressurization transient can add positive reactivity at a faster rate than the control rods can add negative reactivity.

The protection functions of the EOC-RPT have been designed to ensure safe operation of the reactor during load rejection transients. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the EOC-RPT, as well as LCOs on other system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the Safety Limit (SL) is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin

has been added between the Analytical Limit and the calculated trip setting.

'Nominal Trip Setpoint [NTSP]' is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances, in Note 2 of SR 3.3.4.1.2 or 3.3.4.1.3 for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in SR 3.3.4.1.2 or 3.3.4.1.3 for the purpose of compliance with 10 CFR 50.36, the plant-specific location for the [LTSP] or NTSP must be cited in Note 2 of the SRs in the SR table. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [Limiting Trip Setpoint (LTSP)] specified in SR 3.3.4.1.2 and SR 3.3.4.1.3 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in SR 3.3.4.1.3 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety

BASES

ACTIONS (continued)

C.1 and C.2

With any Required Action and associated Completion Time not met, THERMAL POWER must be reduced to < 30% RTP within 4 hours. Alternately, the associated recirculation pump may be removed from service, since this performs the intended function of the instrumentation. The allowed Completion Time of 4 hours is reasonable, based on operating experience, to reduce THERMAL POWER to < 30% RTP from full power conditions in an orderly manner and without challenging plant systems.

Required Action C.1 is modified by a Note which states that the Required Action is only applicable if the inoperable channel is the result of an inoperable RPT breaker. The Note clarifies the situations under which the associated Required Action would be the appropriate Required Action.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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

Notes 1 and 2 are applied to the setpoint verification Surveillances for the TCV Fast Closure Function unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where

condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint

BASES

SURVEILLANCE REQUIREMENTS (continued)

more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. ~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~ The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

SR 3.3.4.1.3

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based upon the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.4.1.3 for the TCV Fast Closure function is modified by two Notes in the SR table. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance

procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-

BASES

SURVEILLANCE REQUIREMENTS (continued)

left tolerance of the [LTSP], then the channel shall be declared inoperable. ~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~ The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

SR 3.3.4.1.4

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The system functional test of the pump breakers is included as a part of this test, overlapping the LOGIC SYSTEM FUNCTIONAL TEST, to provide complete testing of the associated safety function. Therefore, if a breaker is incapable of operating, the associated instrument channel(s) would also be inoperable.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.4.1.5

This SR ensures that an EOC-RPT initiated from the TSV - Closure and TCV Fast Closure, Trip Oil Pressure - Low Functions will not be inadvertently bypassed when THERMAL POWER is ≥ 30% RTP. This involves calibration of the bypass channels. Adequate margins for the instrument setpoint methodologies are incorporated into the actual setpoint. Because main turbine bypass flow can affect this setpoint nonconservatively (THERMAL POWER is derived from first stage pressure) the main turbine bypass valves must remain closed at THERMAL POWER ≥ 30% RTP to ensure that the calibration remains

B 3.3 INSTRUMENTATION

B 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

BASES

BACKGROUND

The purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure that the fuel is adequately cooled in the event of a design basis accident or transient. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ECCS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note f of Table 3.3.5.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.5.1-1 for the purpose of compliance with 10 CFR 50.36, the plant-specific location for the [LTSP] or NTSP must be cited in Note f of Table 3.3.5.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC. ~~The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~

BASES

BACKGROUND (continued)

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.5.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in Table 3.3.5.1-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. Trip setpoints~~ [LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~device~~~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The ~~trip setpoints~~[LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS (or DG) initiation to mitigate the consequences of a design basis transient or accident. To ensure reliable ECCS and DG function, a combination of Functions is required to provide primary and secondary initiation signals.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level - Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated DGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients analyzed in References ~~1~~2 and ~~3~~.4. In addition, the Reactor Vessel Water Level - Low Low Low, Level 1 Function is directly assumed in the analysis of the recirculation line break (Ref. ~~2~~3). The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

BASES

ACTIONS (continued)

Because of the diversity of sensors available to provide initiation signals and the redundancy of the ECCS design, an allowable out of service time of 8 days has been shown to be acceptable (Ref. ~~5~~6) to permit restoration of any inoperable channel to OPERABLE status if both HPCI and RCIC are OPERABLE (Required Action G.2). If either HPCI or RCIC is inoperable, the time shortens to 96 hours. If the status of HPCI or RCIC changes such that the Completion Time changes from 8 days to 96 hours, the 96 hours begins upon discovery of HPCI or RCIC inoperability. However, the total time for an inoperable channel cannot exceed 8 days. If the status of HPCI or RCIC changes such that the Completion Time changes from 96 hours to 8 days, the "time zero" for beginning the 8 day "clock" begins upon discovery of the inoperable channel. If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, Condition H must be entered and its Required Action taken. The Required Actions do not allow placing the channel in trip since this action would not necessarily result in a safe state for the channel in all events.

H.1

With any Required Action and associated Completion Time not met, the associated feature(s) may be incapable of performing the intended function, and the supported feature(s) associated with inoperable untripped channels must be declared inoperable immediately.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

---------- REVIEWER'S NOTE ----------
Notes e and f are applied to the setpoint verification Surveillances for each ECCS Instrumentation Functions in Table 3.3.5.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency of 92 days is based on the reliability analyses of Reference ~~5~~6.

SR 3.3.5.1.3

Calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.5.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is ~~not beyond~~conservative with respect to the Allowable Value, the channel performance is still within the requirements of the plant safety analyses. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than the setting accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference ~~5~~6.

SR 3.3.5.1.3 for selected functions is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document

incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.1.4 and SR 3.3.5.1.5

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency of SR 3.3.5.1.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

The Frequency of SR 3.3.5.1.5 is based upon the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.1.5 for selected functions is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

BASES

BACKGROUND

The purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the reactor vessel is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that initiation of the low pressure Emergency Core Cooling Systems (ECCS) pumps does not occur. A more complete discussion of RCIC System operation is provided in the Bases of LCO 3.5.3, "RCIC System." This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RCIC, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-

found tolerances in Note b of Table 3.3.5.2-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.5.2-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.5.2-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.5.2-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in Table 3.3.5.2-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint ~~less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Each Allowable Value specified accounts for~~ , the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties ~~appropriate to the Function. These uncertainties are described in the setpoint methodology~~, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The individual Functions are required to be OPERABLE in MODE 1, and in MODES 2 and 3 with reactor steam dome pressure > 150 psig since this is when RCIC is required to be OPERABLE. (Refer to LCO 3.5.3 for Applicability Bases for the RCIC System.)

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

BASES

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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

Notes a and b are applied to the setpoint verification Surveillances for all RCIC System Instrumentation Functions in Table 3.3.5.2-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

A generic evaluation of RCIC System Instrumentation Functions resulted in Notes a and b being applied to the Functions shown in TS 3.3.5.2. Each licensee adopting this change must review the list of potential Functions to identify whether any of the identified functions meet any of the exclusion criteria based on the plant-specific design and safety analysis (AOOs). The footnotes applied to Function 3.3.5.2-1.[2], Reactor Vessel Water Level - High, Level 8 are optional.

As noted in the beginning of the SRs, the SRs for each RCIC System ~~instrumentation~~instrument Function are found in the SRs column of Table 3.3.5.2-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed as follows: (a) for up to 6 hours for Functions 2 and 5; and

plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.2.4 and SR 3.3.5.2.5

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of SR 3.3.5.2.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

The Frequency of SR 3.3.5.2.5 is based upon the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. SR 3.3.5.2.4 and SR 3.3.5.2.5 are modified by two Notes as identified in Table 3.3.5.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.2.6

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.3 overlaps this Surveillance to provide complete testing of the safety function.

Table 3.3.2.1-1 (page 1 of 1)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS
1. Rod Pattern Control System			
a. Rod withdrawal limiter	[(a)]	2	SR 3.3.2.1.1 SR 3.3.2.1.6 SR 3.3.2.1.7][(b)] [(c)]
	[(~~b~~d)]	2	SR 3.3.2.1.2 SR 3.3.2.1.5 [(b)] [(c)] SR 3.3.2.1.7][(b)] [(c)]
b. Rod pattern controller	1[(~~c~~e)], 2[(~~c~~e)]	2	SR 3.3.2.1.3 SR 3.3.2.1.4 SR 3.3.2.1.5 SR 3.3.2.1.7 SR 3.3.2.1.9
2. Reactor Mode Switch - Shutdown Position	(~~d~~f)	2	SR 3.3.2.1.8

(a) THERMAL POWER > [70]% RTP.

(b) INSERT 1

(c) INSERT 2

(~~b~~d) THERMAL POWER > [35]% RTP and ≤ [70]% RTP.

(~~c~~e) With THERMAL POWER ≤ [10]% RTP.

(~~d~~f) Reactor mode switch in the shutdown position.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more Functions with EOC-RPT trip capability not maintained. AND [MCPR limit for inoperable EOC-RPT not made applicable.]	B.1 Restore EOC-RPT trip capability. OR [B.2 Apply the MCPR limit for inoperable EOC-RPT as specified in the COLR.	2 hours 2 hours]
C. Required Action and associated Completion Time not met.	C.1 Remove the associated recirculation pump fast speed breaker from service. OR C.2 Reduce THERMAL POWER to < [40]% RTP.	4 hours 4 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------

When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains EOC-RPT trip capability.

SURVEILLANCE		FREQUENCY
SR 3.3.4.1.1	Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.4.1.2	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset	[92] days]

SURVEILLANCE	FREQUENCY
to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) -at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].	
[Calibrate the trip units.	

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.4.1.3	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The LTSP and the methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference]. ---------- Perform CHANNEL CALIBRATION. The Allowable Values shall be: a. TSV Closure, Trip Oil Pressure - Low: ≥ [37] psig and b. TCV Fast Closure, Trip Oil Pressure - Low: ≥ [42] psig.	[18] months
SR 3.3.4.1.4	Perform LOGIC SYSTEM FUNCTIONAL TEST, including breaker actuation.	[18] months
SR 3.3.4.1.5	Verify TSV Closure, Trip Oil Pressure - Low and TCV Fast Closure, Trip Oil Pressure - Low Functions are not bypassed when THERMAL POWER is ≥ [40]% RTP.	[18] months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.6.5.2	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [Limiting Trip Setpoint (LTSP) or Nominal Trip Setpoint (NTSP)] at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the [LTSP or NTSP] are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance. The [Limiting Trip Setpoint or Nominal Trip Setpoint and the] methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference]. ---------- [Calibrate the trip unit.	[92] days]
SR 3.3.6.5.3	----------NOTES---------- 1. If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. 2. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [Limiting Trip Setpoint (LTSP) or Nominal Trip Setpoint (NTSP)] at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the [LTSP or NTSP] are acceptable provided that the as-found and as-	[18] months

	left tolerances apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance. The [Limiting Trip Setpoint or Nominal Trip Setpoint and the] methodologies used to determine the as-found and the as-left tolerances are specified in [insert the facility FSAR reference or the name of a ~~document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].	
	Perform CHANNEL CALIBRATION. The Allowable Values shall be: a. Relief Function Low: [1103 ± 15 psig] Medium: [1113 ± 15 psig] High: [1123 ± 15 psig] b. LLS Function Low open: [1033 ± 15 psig] close: [926 ± 15 psig] Medium open: [1073 ± 15 psig] close [936 ± 15 psig] High open: [1113 ± 15 psig] close: [946 ± 15 psig]	
SR 3.3.6.5.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	[18] months

B 3.3 INSTRUMENTATION

B 3.3.1.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limit, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS), and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters, and equipment performance. Technical Specifications are required by 10 CFR 50.36 to contain LSSS defined by the regulation as "...settings for automatic protective devices...so chosen that automatic protective action will correct the abnormal situation before a Safety Limit (SL) is exceeded." ~~The Analytic Limit is the limit of the process variable at which a safety~~

Technical Specifications are required by 10 CFR 50.36 to~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protective ~~devices~~channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin

has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note b of Table 3.3.1.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.1.1-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.1.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [LTSP] specified in Table 3.3.1.1-1 is a predetermined setting for a ~~protective device~~protection channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [LTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[LTSP] ensures that SLs are not exceeded. As such, the ~~trip setpoint~~[LTSP] meets the definition of an LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." ~~For automatic protective devices,~~Relying solely on the ~~required safety function is to ensure that a SL is not exceeded and therefore the LSSS as defined by 10 CFR 50.36 is the same as the OPERABILITY limit for these devices. However, use of the trip setpoint~~[LTSP] to define OPERABILITY in Technical Specifications ~~and its corresponding designation as the LSSS required by 10 CFR 50.36~~ would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a ~~protective~~

BASES

BACKGROUND (continued)

Two scram pilot valves are located in the hydraulic control unit (HCU) for each control rod drive (CRD). Each scram pilot valve is solenoid operated, with the solenoids normally energized. The scram pilot valves control the air supply to the scram inlet and outlet valves for the associated CRD. When either scram pilot valve solenoid is energized, air pressure holds the scram valves closed and, therefore, both scram pilot valve solenoids must be de-energized to cause a control rod to scram. The scram valves control the supply and discharge paths for the CRD water during a scram. One of the scram pilot valve solenoids for each CRD is controlled by trip system A, and the other solenoid is controlled by trip system B. Any trip of trip system A in conjunction with any trip in trip system B results in de-energizing both solenoids, air bleeding off, scram valves opening, and control rod scram.

The backup scram valves, which energize on a scram signal to depressurize the scram air header, are also controlled by the RPS. Additionally, the RPS System controls the SDV vent and drain valves such that when both trip systems trip, the SDV vent and drain valves close to isolate the SDV.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The actions of the RPS are assumed in the safety analyses of References 3, 4, and 5. The RPS initiates a reactor scram when monitored parameter values are exceeded~~exceed the Allowable Values specified by the setpoint methodology and listed in Table 3.3.1.1-1~~ to preserve the integrity of the fuel cladding, the reactor coolant pressure boundary (RCPB), and the containment by minimizing the energy that must be absorbed following a LOCA.

RPS instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii). Functions not specifically credited in the accident analysis are retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

Notes a and b are applied to the setpoint verification Surveillances for all RPS Instrumentation Functions in Table 3.3.1.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

As noted at the beginning of the SRs, the SRs for each RPS ~~instrumentation~~instrument Function are located in the SRs column of Table 3.3.1.1-1.

The Surveillances are modified by a Note to indicate that, when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the RPS reliability analysis (Ref. 10) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

SR 3.3.1.1.1

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.8

The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.1.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is ~~not beyond~~conservative with respect to the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to ~~be equal to or more conservative than~~the [LTSP] within the as-left tolerance as accounted for in the appropriate setpoint methodology.

The Frequency of 92 days for SR 3.3.1.1.8 is based on the reliability analysis of Reference 10.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.8 for the designated functions is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.9 and SR 3.3.1.1.11

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to the [LTSP] within the as-left tolerance to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

Note 1 states that neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices, with minimal drift, and because of the difficulty of simulating a meaningful signal. Changes in neutron detector sensitivity are compensated for by performing the 7 day

calorimetric calibration (SR 3.3.1.1.2) and the 1000 MWD/T LPRM calibration against the TIPs (SR 3.3.1.1.6). A second Note is provided that requires the APRM and IRM SRs to be performed within 12 hours of entering MODE 2 from MODE 1. Testing of the MODE 2 APRM and IRM Functions cannot be performed in MODE 1 without utilizing jumpers, lifted leads, or movable links. This Note allows entry into MODE 2 from MODE 1 if the associated Frequency is not met per SR 3.0.2. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

The Frequency of SR 3.3.1.1.9 is based upon the assumption of a 184 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.1.1.11 is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SRs 3.3.1.1.9 and 3.3.1.1.11 for the designated functions are modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.12

The Average Power Range Monitor Flow Biased Simulated Thermal Power - High Function uses an electronic filter circuit to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This filter circuit is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. The filter time constant must be verified to ensure that the channel is accurately reflecting the desired parameter.

The Frequency of 18 months is based on engineering judgment and reliability of the components.

SR 3.3.1.1.12 is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

Frequency ensures that the channels are OPERABLE while core reactivity changes could be in progress. This 7 day Frequency is reasonable, based on operating experience and on other Surveillances (such as a CHANNEL CHECK) that ensure proper functioning between CHANNEL FUNCTIONAL TESTS.

SR 3.3.1.2.6 is required in MODE 2 with IRMs on Range 2 or below and in MODES 3 and 4. Since core reactivity changes do not normally take place, the Frequency has been extended from 7 days to 31 days. The 31 day Frequency is based on operating experience and on other Surveillances (such as (CHANNEL CHECK) that ensure proper functioning between CHANNEL FUNCTIONAL TESTS.

Verification of the signal to noise ratio also ensures that the detectors are inserted to a normal operating level. In a fully withdrawn condition, the detectors are sufficiently removed from the fueled region of the core to essentially eliminate neutrons from reaching the detector. Any count rate obtained while fully withdrawn is assumed to be "noise" only.

The Note to the Surveillance allows the Surveillance to be delayed until entry into the specified condition of the Applicability. The SR must be performed in MODE 2 within 12 hours of entering MODE 2 with IRMs on Range 2 or below. The allowance to enter the Applicability with the 31 day Frequency not met is reasonable, based on the limited time of 12 hours allowed after entering the Applicability and the inability to perform the Surveillance while at higher power levels. Although the Surveillance could be performed while on IRM Range 3, the plant would not be expected to maintain steady state operation at this power level. In this event, the 12 hour Frequency is reasonable, based on the SRMs being otherwise verified to be OPERABLE (i.e., satisfactorily performing the CHANNEL CHECK) and the time required to perform the Surveillances.

SR 3.3.1.2.7

Performance of a CHANNEL CALIBRATION verifies the performance of the SRM detectors and associated circuitry. The Frequency considers the plant conditions required to perform the test, the ease of performing the test, and the likelihood of a change in the system or component status. The neutron detectors are excluded from the CHANNEL CALIBRATION because they cannot readily be adjusted. The detectors are fission chambers that are designed to have a relatively constant sensitivity over the range, and with an accuracy specified for a fixed useful life.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Note 2 to the Surveillance allows the Surveillance to be delayed until entry into the specified condition of the Applicability. The SR must be performed in MODE 2 within 12 hours of entering MODE 2 with IRMs on Range 2 or below. The allowance to enter the Applicability with the 18 month Frequency not met is reasonable, based on the limited time of 12 hours allowed after entering the Applicability and the inability to perform the Surveillance while at higher power levels. Although the Surveillance could be performed while on IRM Range 3, the plant would not be expected to maintain steady state operation at this power level. In this event, the 12 hour Frequency is reasonable, based on the SRMs being otherwise verified to be OPERABLE (i.e., satisfactorily performing the CHANNEL CHECK) and the time required to perform the Surveillances. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

REFERENCES None.

B 3.3 INSTRUMENTATION

B 3.3.2.1 Control Rod Block Instrumentation

BASES

BACKGROUND

Control rods provide the primary means for control of reactivity changes. Control rod block instrumentation includes channel sensors, logic circuitry, switches, and relays that are designed to ensure that specified fuel design limits are not exceeded for postulated transients and accidents. During high power operation, the rod withdrawal limiter (RWL) provides protection for control rod withdrawal error events. During low power operations, control rod blocks from the rod pattern controller (RPC) enforce specific control rod sequences designed to mitigate the consequences of the control rod drop accident (CRDA). During shutdown conditions, control rod blocks from the Reactor Mode Switch - Shutdown Position ensure that all control rods remain inserted to prevent inadvertent criticalities.

The protection and monitoring functions of the control rod block instrumentation have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
-The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note c of Table 3.3.2.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in SR 3.3.2.1.7, the plant-specific location for the [LTSP] or [NTSP] must be cited in Note c of Table 3.3.2.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.2.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Values specified in SR 3.3.2.1.7 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in

BASES

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

---------- REVIEWER'S NOTE ----------
Notes b and c are applied to the setpoint verification Surveillances for the Rod Withdrawal Limiter functions in SR 3.3.2.1.7 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

As noted at the beginning of the SR, the SRs for each Control Rod Block instrumentation Function are found in the SRs column of Table 3.3.2.1-1.

The Surveillances are also modified by a Note to indicate that when an RWL channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains control rod block capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Ref. ~~8~~9) assumption of the average time required to perform channel Surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that a control rod block will be initiated when necessary.

SR 3.3.2.1.1, SR 3.3.2.1.2, SR 3.3.2.1.3, and SR 3.3.2.1.4

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.1.5

The LPSP is the point at which the RPCS makes the transition between the function of the RPC and the RWL. This transition point is automatically varied as a function of power. This power level is inferred from the first stage turbine pressure (one channel to each trip system). These power setpoints must be verified periodically to be within the Allowable Values. If any LPSP is nonconservative, then the affected Functions are considered inoperable. Since this channel has both upper and lower required limits, it is not allowed to be placed in a condition to enable either the RPC or RWL Function. Because main turbine bypass steam flow can affect the LPSP nonconservatively for the RWL, the RWL is considered inoperable with any main turbine bypass valves open. The Frequency of 92 days is based on the setpoint methodology utilized for these channels.

SR 3.3.2.1.5 for the Rod withdrawal limiter functions is modified by two Notes as identified in Table 3.3.2.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~The Frequency is based upon the assumption of the magnitude of equipment drift in the setpoint analysis.~~

The Frequency is based upon the assumption of the magnitude of equipment drift in the setpoint analysis. SR 3.3.2.1.7 for the Rod withdrawal limiter functions is modified by two Notes as identified in Table 3.3.2.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.2.1.8

The CHANNEL FUNCTIONAL TEST for the Reactor Mode Switch - Shutdown Position Function is performed by attempting to withdraw any control rod with the reactor mode switch in the shutdown position and verifying a control rod block occurs. A successful test of the required contact(s) of a channel relay may be performed by the verification of the

B 3.3 INSTRUMENTATION

B 3.3.4.1 End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation

BASES

BACKGROUND

The EOC-RPT instrumentation initiates a recirculation pump trip (RPT) to reduce the peak reactor pressure and power resulting from turbine trip or generator load rejection transients to provide additional margin to core thermal MCPR Safety Limits (SLs).

The need for the additional negative reactivity in excess of that normally inserted on a scram reflects end of cycle reactivity considerations. Flux shapes at the end of cycle are such that the control rods may not be able to ensure that thermal limits are maintained by inserting sufficient negative reactivity during the first few feet of rod travel upon a scram caused by Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure - Low, or Turbine Stop Valve Closure, Trip Oil Pressure - Low (TSV). The physical phenomenon involved is that the void reactivity feedback due to a pressurization transient can add positive reactivity at a faster rate than the control rods can add negative reactivity.

The protection functions of the EOC-RPT have been designed to ensure safe operation of the reactor during load rejection transients. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the EOC-RPT, as well as LCOs on other system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin

has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note 2 of the SRs, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in SR 3.3.4.1.2 or SR 3.3.4.1.3 for the purpose of compliance with 10 CFR 50.36, the plant-specific location for the [LTSP] or NTSP must be cited in Note 2 of the SRs in the SR table. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

BASES

BACKGROUND (continued)

The [Limiting Trip Setpoint (LTSP)] specified in SR 3.3.4.1.3 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). Therefore, the [LTSP] ensures that SLs are not exceeded. As such, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in SR 3.3.4.1.3 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long

BASES

ACTIONS (continued)

C.1 and C.2

With any Required Action and associated Completion Time not met, THERMAL POWER must be reduced to < 40% RTP within 4 hours. Alternately, the associated recirculation pump may be removed from service since this performs the intended function of the instrumentation. The allowed Completion Time of 4 hours is reasonable, based on operating experience, to reduce THERMAL POWER to < 40% RTP from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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

Notes 1 and 2 are applied to the setpoint verification Surveillances for all EOC-RPT Instrumentation Functions unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.4.1.2

The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the setting is discovered to be less conservative than the Allowable Value specified in SR 3.3.4.1.3. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is ~~not beyond~~conservative with respect to the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on assumptions of the reliability analysis (Ref. ~~5~~6) and on the methodology included in the determination of the trip setpoint.

SR 3.3.4.1.2 is modified by two Notes in the SR table. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]. ~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.4.1.3

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based upon the assumption of an 18 month calibration interval, in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.4.1.3 is modified by two Notes in the SR table. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]. ~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.4.1.4

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The system functional test of the pump breakers is included as a part of this test, overlapping the LOGIC SYSTEM FUNCTIONAL TEST, to provide

B 3.3 INSTRUMENTATION

B 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

BASES

BACKGROUND

The purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure that fuel is adequately cooled in the event of a design basis accident or transient. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ECCS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note f of Table 3.3.5.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.5.1-1 for the purpose of compliance with 10 CFR 50.36, the plant-specific location for the [LTSP] or NTSP must be cited in Note f of Table 3.3.5.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC. ~~The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~ .

BASES

BACKGROUND (continued)

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.5.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in Table 3.3.5.1-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS (or DG) initiation to mitigate the consequences of a design basis accident or transient. To ensure reliable ECCS and DG function, a combination of Functions is required to provide primary and secondary initiation signals.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Low Pressure Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level - Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated DGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients analyzed in References ~~1~~2 and ~~3.~~4. In addition, the Reactor Vessel Water Level - Low Low Low, Level 1 Function is directly assumed in the analysis of the recirculation line break (Ref. ~~2~~3). The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Reactor Vessel Water Level - Low Low Low, Level 1 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. The Reactor Vessel Water Level - Low Low Low, Level 1 Allowable Value is

BASES

ACTIONS (continued)

H.1

With any Required Action and associated Completion Time not met, the associated feature(s) may be incapable of performing the intended function and the supported feature(s) associated with the inoperable untripped channels must be declared inoperable immediately.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

---------- REVIEWER'S NOTE ----------
Notes c and d are applied to the setpoint verification Surveillances for each ECCS Instrumentation Functions in Table 3.3.5.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

A generic evaluation of ECCS Instrumentation Functions resulted in Notes e and f being applied to the Functions shown in TS 3.3.5.1. Each licensee adopting this change must review the list of potential Functions to identify whether any of the identified functions meet any of the exclusion criteria based on the plant-specific design and safety analysis (AOOs). The footnotes applied to Function 3.3.5.1-1.[3.c], Reactor Vessel Water Level - High, Level 8 are optional. Functions 3.3.5.1-1.[3.f], High Pressure Coolant System Pump Discharge Pressure - High (Bypass) and 3.3.5.1-1 [3.g] High Pressure Coolant System Flow Rate –

SR 3.3.5.1.3 for designated functions is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of ~~a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or~~ any document incorporated into the facility FSAR by reference].

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1.4 and SR 3.3.5.1.5

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency of SR 3.3.5.1.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. For SR 3.3.5.1.4 there is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of SR 3.3.5.1.5 is based upon the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.1.5 for designated functions is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility

FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.1.6

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.1, LCO 3.5.2, LCO 3.8.1, and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety function.

The [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for unplanned transients if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the [18] month Frequency.

SR 3.3.5.1.7

This SR ensures that the individual channel response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in Reference ~~5~~6.

ECCS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements.

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

BASES

BACKGROUND

The purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the reactor vessel is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that initiation of the low pressure Emergency Core Cooling Systems (ECCS) pumps does not occur. A more complete discussion of RCIC System operation is provided in the Bases of LCO 3.5.3, "RCIC System." This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RCIC instrumentation, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note b of Table 3.3.5.2-1, for the phrase "[insert the

name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.5.2-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.5.2-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

BASES

BACKGROUND (continued)

The [Limiting Trip Setpoint (LTSP)] specified in Table 3.3.5.2-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in Table 3.3.5.2-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint ~~less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Each Allowable Value specified accounts for~~, the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties ~~appropriate to the Function. These uncertainties are described in the~~, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

The individual Functions are required to be OPERABLE in MODE 1, and in MODES 2 and 3 with reactor steam dome pressure > 150 psig, since this is when RCIC is required to be OPERABLE. (Refer to LCO 3.5.3 for Applicability Bases for the RCIC System.)

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

BASES

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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

Notes a and b are applied to the setpoint verification Surveillances for all RCIC System Instrumentation Functions in Table 3.3.5.2-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

A generic evaluation of RCIC System Instrumentation Functions resulted in Notes a and b being applied to the Functions shown in TS 3.3.5.2. Each licensee adopting this change must review the list of potential Functions to identify whether any of the identified functions meet any of the exclusion criteria based on the plant-specific design and safety analysis (AOOs). The footnotes applied to Function 3.3.5.2-1.[2], Reactor Vessel Water Level - High, Level 8 are optional.

As noted in the beginning of the SRs, the SRs for each RCIC System ~~instrumentation~~instrument Function are found in the SRs column of Table 3.3.5.2-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed as follows: (a) for up to 6 hours for Functions 2 and 5; and

within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.5.2.4

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter with the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.2.4 is modified by two Notes as identified in Table 3.3.5.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained.

If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable. The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency is based on reliability analysis described in References 5 and 6.

SR 3.3.6.1.3

The calibration of trip units consists of a test to provide a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.6.1-1. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of References 5 and 6.

SR 3.3.6.1.4 and SR 3.3.6.1.5

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. CHANNEL

B 3.3 INSTRUMENTATION

B 3.3.6.5 Relief and Low-Low Set (LLS) Instrumentation

BASES

BACKGROUND

The safety/relief valves (S/RVs) prevent overpressurization of the nuclear steam system. Instrumentation is provided to support two modes of S/RV operation - the relief function (all valves) and the LLS function (selected valves). Refer to LCO 3.4.4, "Safety/Relief Valves (S/RVs)," and LCO 3.6.1.6, "Low-Low Set (LLS) Safety/Relief Valves (S/RVs)," for Applicability Bases for additional information of these modes of S/RV operation. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the Safety/Relief valve instrumentation, as well as LCOs on other reactor system parameters, and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that an SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

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

The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note 2 of SR 3.3.6.5.2 and SR 3.3.6.5.3, for the

phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

Where the [LTSP] is not documented in SR 3.3.6.5.2 and 3.3.6.5.3, the plant-specific location for the [LTSP] or NTSP must be cited in Note 2 of SR 3.3.6.5.2 and 3.3.6.5.3. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC. ~~The as-found and as-left tolerances will apply to the actual setpoint~~.

BASES

BACKGROUND (continued)

implemented in the Surveillance procedures to confirm channel performance.

The [Limiting Trip Setpoint (LTSP)] specified in SR 3.3.6.5.2 and SR 3.3.6.5.3 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the t[LTSP] ensures that SLs are not exceeded. Therefore the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in SR 3.3.6.5.2 and 3.3.6.5.3 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains relief or LLS initiation capability, as applicable. Upon completion of the

safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.5.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based upon the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.6.5.3 is modified by two Notes. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

Attachment B

TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions"

Revised Option B Pages

5.5 Programs and Manuals

5.5.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, based on [the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," or of the battery manufacturer] including the following:

a. Actions to restore battery cells with float voltage < [2.13] V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

5.5.18 Setpoint Control Program

This program shall establish the requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses, provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program shall ensure that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

a. The program shall list the Functions in the following specifications to which it applies:

1. LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation;"
2. LCO 3.3.3, "Reactor Protection System (RPS) - Reactor Trip Module (RTM);"
3. LCO 3.3.4, "CONTROL ROD Drive (CRD) Trip Devices;"
4. LCO 3.3.5, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation;"
5. LCO 3.3.8, "Emergency Diesel Generator (EDG) Loss of Power Start (LOPS);"
6. LCO 3.3.9, "Source Range Neutron Flux;"
7. LCO 3.3.10, "Intermediate Range Neutron Flux;"
8. LCO 3.3.11, "Emergency Feedwater Initiation and Control (EFIC) System Instrumentation;"
9. LCO 3.3.15, "Reactor Building (RB) Purge Isolation - High Radiation;"
10. LCO 3.3.16, "Control Room Isolation - High Radiation."

b. The program shall require the Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) (as applicable) of the Functions described in Paragraph a. are calculated using the NRC approved setpoint methodology, as listed below. In addition, the program shall contain the value of the LTSP, NTSP, AV, AFT, and ALT (as applicable) for each Function described in paragraph a. and shall identify the setpoint methodology used to calculate these values.

---------- Reviewer's Note ----------
List the NRC safety evaluation report by letter, date, and ADAMS accession number (if available) that approved the setpoint methodologies.
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1. [Insert reference to NRC safety evaluation that approved the setpoint methodology.]

c. The program shall establish methods to ensure that Functions described in Paragraph a. will function as required by verifying the as-left and as-found settings are consistent with those established by the setpoint methodology.

d. ----------REVIEWER'S NOTE----------
A license amendment request to implement a Setpoint Control Program must list the instrument functions to which the program requirements of paragraph d. will be applied. Paragraph d. shall apply to all Functions in the Reactor Protection System and Engineered Safety Feature Actuation System specifications unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or to instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The program shall identify the Functions described in Paragraph a. that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). The LTSP of these Functions are Limiting Safety System Settings. These Functions shall be demonstrated to be functioning as required by applying the following requirements during CHANNEL CALIBRATIONS and CHANNEL FUNCTIONAL TESTS that verify the [LTSP or NTSP].

1 The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified [LTSP or NTSP].

2. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified [LTSP or NTSP] by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated before declaring the SR met and returning the instrument channel to service. This condition shall be entered in the plant corrective action program.

3. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, then the SR is not met and the instrument channel shall be immediately declared inoperable.

4. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [LTSP or NTSP] at the completion of the surveillance test; otherwise, the channel is inoperable(setpoints may be more conservative than the [LTSP or NTSP] provided that the as-found and as-left tolerances apply to the actual setpoint used to confirm channel performance).

e. The program shall be specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~Changes to the program shall be made in accordance with the requirements of 10 CFR 50.59. Revisions or supplements to the program shall be provided upon issuance to the NRC.~~

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor trip to protect against violating the core fuel design limits and the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Feature (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as the LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "~~...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

BASES

BACKGROUND (continued)

The Allowable Values listed in ~~Table 3.3.1-1~~the SCP are based on the methodology described in ~~"[Unit Specific~~the Setpoint ~~Methodology]" (Ref. 5),~~Control Program, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of those uncertainties are factored into the determination of each ~~trip setpoint.~~[LTSP]. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RPS Functions to preserve the SLs during all AOOs and mitigates the consequences of DBAs. Each of the analyzed accidents and transients can be detected by one or more RPS Functions. The accident analysis contained in Reference 6 takes credit for most RPS trip Functions. Functions not specifically credited in the accident analysis were implicitly~~qualitatively~~ credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions are high RB pressure, high temperature, turbine trip, and loss of main feedwater. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions also serve as backups to Functions that were credited in the safety analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The LCO requires all instrumentation performing an RPS Function to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions. The four channels of each Function in Table 3.3.1-1 of the RPS instrumentation shall be OPERABLE during its specified Applicability to ensure that a reactor trip will be actuated if needed. Additionally, during shutdown bypass with any CRD trip breaker closed, the applicable RPS Functions must also be available. This ensures the capability to trip the withdrawn CONTROL RODS exists at all times that rod motion is possible. The trip Function channels specified in Table 3.3.1-1 are considered OPERABLE when all channel components necessary to provide a reactor trip are functional and in service for the required MODE or Other Specified Condition listed in Table 3.3.1-1.

Required Actions allow maintenance (protection channel) bypass of individual channels, but the bypass activates interlocks that prevent operation with a second channel bypass. Bypass effectively places the unit in a two-out-of-three logic configuration that can still initiate a reactor trip, even with a single failure within the system.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~Only the Allowable Values are specified for each RPS trip Function in the LCO. Nominal trip setpoints are specified in the unit specific setpoint calculations. The nominal setpoints are selected to ensure that the setpoint measured by CHANNEL FUNCTIONAL TESTS does not exceed the Allowable Value if the bistable is performing as required. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that operation and testing are consistent with the assumptions of the unit specific setpoint calculations. Each Allowable Value specified is more conservative than instrument uncertainties appropriate to the trip Function. These uncertainties are defined in the "[Unit Specific Setpoint Methodology]" (Ref. 5).~~

For most RPS Functions, the ~~trip setpoint Allowable Value is to ensure~~[LTSP] ensures that the departure from nucleate boiling (DNB) or the RCS ~~pressure~~Pressure SL~~s~~ is ~~are~~ not challenged. Cycle specific figures for use during operation are contained in the COLR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the resistance temperature detectors (RTD) sensors is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed sensing element.

The Frequency is justified by the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the ~~setpoint~~[LTSP] analysis.

SR 3.3.1.6

This SR verifies individual channel actuation response times are less than or equal to the maximum values assumed in the accident analysis. Individual component response times are not modeled in the analyses. The analyses model the overall, or total, elapsed time from the point at which the parameter exceeds the analytical limit at the sensor to the point of rod insertion. Response time testing acceptance criteria for this unit are included in Reference 2.

A Note to the Surveillance indicates that neutron detectors are excluded from RPS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

Response time tests are conducted on an [18] month STAGGERED TEST BASIS. Testing of the final actuation devices~~channels~~, which make up the bulk of the response time, is included in the testing of each channel. Therefore, staggered testing results in response time verification of these ~~devices~~channels every [18] months. The [18] month Frequency is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

B 3.3 INSTRUMENTATION

B 3.3.5 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit Parameters, to protect against violating core design limits and reactor coolant pressure boundary and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as the LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [Limiting Trip Setpoint (LTSP)] specified in the SCP, is a predetermined setting for a protection channel chosen to ensure

5.5 Programs and Manuals

5.5.16 Containment Leakage Rate Testing Program (continued)

1. Containment leakage rate acceptance criterion is ≤ 1.0 L_a. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are < 0.60 L_a for the Type B and C tests and [< 0.75 L_a for Option A Type A tests] [≤ 0.75 L_a for Option B Type A tests].

2. Air lock testing acceptance criteria are:

   a) Overall air lock leakage rate is ≤ [0.05 L_a] when tested at ≥ P_a.

   b) For each door, leakage rate is ≤ [0.01 L_a] when pressurized to [≥ 10 psig].

e. The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

f. Nothing in these Technical Specifications shall be construed to modify the testing Frequencies required by 10 CFR 50, Appendix J.

5.5.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, based on [the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," or of the battery manufacturer] including the following:

a. Actions to restore battery cells with float voltage < [2.13] V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

5.5.18 Setpoint Control Program

This program shall establish the requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses, provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program shall ensure that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

a. The program shall list the Functions in the following specifications to which it applies:

1. LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation;"
2. LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation Functions;"
3. LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation;"
4. LCO 3.3.6, "Containment Purge and Exhaust Isolation Instrumentation;"
5. LCO 3.3.7, "Control Room Emergency Filtration System (CREFS) Actuation Instrumentation;"
6. LCO 3.3.8, "Fuel Building Air Cleanup System (FBACS) Actuation Instrumentation;" and
7. LCO 3.3.9, "Boron Dilution Protection System (BDPS)."

b. The program shall require the Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) (as applicable) of the Functions described in Paragraph a. are calculated using the NRC approved setpoint methodology, as listed below. In addition, the program shall contain the value of the NTSP, AV, AFT, and ALT (as applicable) for each Function described in paragraph a. and shall identify the setpoint methodology used to calculate these values.

---------- Reviewer's Note ----------
List the NRC safety evaluation report by letter, date, and ADAMS accession number (if available) that approved the setpoint methodologies.
---

1. [Insert reference to NRC safety evaluation that approved the setpoint methodology.]

c. The program shall establish methods to ensure that Functions described in Paragraph a. will function as required by verifying the as-left and as-found settings are consistent with those established by the setpoint methodology.

d. ----------REVIEWER'S NOTE----------
A license amendment request to implement a Setpoint Control Program must list the instrument functions to which the program requirements of paragraph d. will be applied. Paragraph d. shall apply to all Functions in the Reactor Trip System and Engineered Safety Feature Actuation System specifications unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or to instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with

as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The program shall identify the Functions described in Paragraph a. that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). The NTSP of these Functions are Limiting Safety System Settings. These Functions shall be demonstrated to be functioning as required by applying the following requirements during CHANNEL CALIBRATIONS, CHANNEL OPERATIONAL TESTS, and TRIP ACTUATING DEVICE OPERATIONAL TESTS that verify the NTSP.

1 The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified NTSP.

2. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified NTSP by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated before declaring the SR met and returning the instrument channel to service. This condition shall be entered in the plant corrective action program.

3. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, then the SR is not met and the instrument channel shall be immediately declared inoperable.

4. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the NTSP at the completion of the surveillance test; otherwise, the channel is inoperable(setpoints may be more conservative than the NTSP provided that the as-found and as-left tolerances apply to the actual setpoint used to confirm channel performance).

e. The program shall be specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~Changes to the program shall be made in accordance with the requirements of 10 CFR 50.59. Revisions or supplements to the program shall be provided upon issuance to the NRC.~~

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for~~ "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective ~~devices...so chosen that automatic protective action~~actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a ~~safety~~protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) and controlled by 10.CFR.50.59.

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

The ~~trip~~ term "Limiting Trip Setpoint (LTSP)" is generic terminology for the calculated field setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

For most Westinghouse plants the term Nominal Trip Setpoint (NTSP) is in place of the term LTSP and NTSP will replace LTSP in the Bases descriptions. "Field setting" is the suggested terminology for the actual

setpoint where margin has been added to the calculated field setting. The as-found and as-left tolerances will apply to the field setting implemented in the Surveillance procedures to confirm channel performance.

The [NTSP] and field setting are located in the SCP

The [Nominal Trip Setpoint (NTSP)] specified in the SCP is a predetermined setting for a ~~protective device~~protection channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [NTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[NTSP] ensures that SLs are not exceeded. ~~As such~~Therefore, the ~~trip setpoint~~[NTSP] meets the definition of an LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety functions(s)." ~~For automatic protective devices,~~Relying solely on the ~~required safety function is to ensure that a SL is not exceeded and therefore the LSSS as defined by 10 CFR 50.36 is the same as the OPERABILITY limit for these devices. However, use of the trip setpoint~~[NTSP] to define OPERABILITY in Technical Specifications ~~and its corresponding designation as the LSSS required by 10 CFR 50.36~~ would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a ~~protective device~~protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic ~~protective device~~protection channel with a setting that has been found to be different from the ~~trip setpoint~~[NTSP] due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the ~~trip setpoint~~[NTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the ~~protective device.~~protection channel. Therefore, the ~~device~~channel would still be OPERABLE since it would have performed

BASES

BACKGROUND (continued)

The RTS instrumentation is segmented into four distinct but interconnected modules as illustrated in Figure [ ], FSAR, Chapter [7] (Ref. 2), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured,

2. Signal Process Control and Protection System, including Analog Protection System, Nuclear Instrumentation System (NIS), field contacts, and protection channel sets: provides signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system ~~devices~~channels, and control board/control room/miscellaneous indications,

3. Solid State Protection System (SSPS), including input, logic, and output bays: initiates proper unit shutdown and/or ESF actuation in accordance with the defined logic, which is based on the bistable outputs from the signal process control and protection system, and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the ~~trip setpoint~~[NTSP] and Allowable ~~Values.~~Value. The OPERABILITY of each transmitter or sensor is determined by either "as-found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of the CHANNEL CHECK~~. The specific as-found values to ensure that the channel is OPERABLE and that Safety Limits are not exceeded are specified in the SCP.~~.

BASES

BACKGROUND (continued)

During normal operation the output from the SSPS is a voltage signal that energizes the undervoltage coils in the RTBs and bypass breakers, if in use. When the required logic matrix combination is completed, the SSPS output voltage signal is removed, the undervoltage coils are de-energized, the breaker trip lever is actuated by the de-energized undervoltage coil, and the RTBs and bypass breakers are tripped open. This allows the shutdown rods and control rods to fall into the core. In addition to the de-energization of the undervoltage coils, each breaker is also equipped with a shunt trip device that is energized to trip the breaker open upon receipt of a reactor trip signal from the SSPS. Either the undervoltage coil or the shunt trip mechanism is sufficient by itself, thus providing a diverse trip mechanism.

The decision logic matrix Functions are described in the functional diagrams included in Reference 3. In addition to the reactor trip or ESF, these diagrams also describe the various "permissive interlocks" that are associated with unit conditions. Each train has a built in testing device that can automatically test the decision logic matrix Functions and the actuation ~~devices~~channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device is semiautomatic to minimize testing time.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to maintain the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 4 takes credit for most RTS trip Functions. RTS trip Functions not specifically credited in the accident analysis are implicitly~~qualitatively~~ credited in the safety analysis and the NRC staff approved licensing basis for the unit. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RTS trip Functions that were credited in the accident analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint (LTSP)" is generic terminology for the calculated field setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

For most Westinghouse plants the term Nominal Trip Setpoint (NTSP) is used in place of the term LTSP, and NTSP will replace LTSP in the Bases descriptions. "Field setting" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated field setting. The as-found and as-left tolerances will apply to the field setting implemented in the Surveillance procedures to confirm channel performance.

The [NTSP] is included in the SCP.

BASES

BACKGROUND (continued)

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4~~4~~5). The actual number of channels required for each unit parameter is specified in Reference ~~2~~3.

~~Allowable Values~~[NTSPs] and ESFAS Setpoints [Allowable Values]

The trip setpoints used in the bistables are based on the analytical limits stated in Reference ~~2.~~3. The ~~selection~~calculation of ~~these trip setpoints~~the Nominal Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. ~~5~~6), the Allowable Values specified in ~~Table 3.3.2-1 in~~ the ~~accompanying LCO~~SCP are conservative with respect to the analytical limits. A detailed description of the methodology used to calculate the Allowable Values and ESFAS ~~setpoints~~[NTSPs] including their explicit uncertainties, is provided in the plant specific setpoint methodology study (Ref. ~~6~~7) which incorporates all of the known uncertainties applicable to each channel. The as-left tolerance and as-found tolerance band methodology is provided in the SCP. The magnitudes of these uncertainties are factored into the determination of each ESFAS ~~setpoint~~[NTSP] and corresponding Allowable Value. The nominal ESFAS setpoint entered into the bistable is more conservative than that specified by the ~~Allowable Value~~[NTSP] to account for measurement errors detectable by the COT. The Allowable Value serves as the as-found trip setpoint Technical Specification OPERABILITY limit for the purpose of the COT. ~~One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.~~

The ~~ESFAS setpoints are~~[NTSP] is the ~~values~~value at which the bistables are set and is the expected value to be achieved during calibration. The ~~ESFAS setpoint~~[NTSP] value, is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable

BASES

BACKGROUND (continued)

Each SSPS train has a built in testing device~~channel~~ that can automatically test the decision logic matrix functions and the actuation ~~devices~~channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device~~channel~~ is semiautomatic to minimize testing time.

The actuation of ESF components is accomplished through master and slave relays. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays, which then cause actuation of the end devices.~~channels.~~ The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices~~channels~~ if their operation will not interfere with continued unit operation. For the latter case, actual component operation is prevented by the SLAVE RELAY TEST circuit, and slave relay contact operation is verified by a continuity check of the circuit containing the slave relay.

----------REVIEWER'S NOTE----------
No one unit ESFAS incorporates all of the Functions listed in Table 3.3.2-1. In some cases (e.g., Containment Pressure - High 3, Function 2.c), the Table reflects several different implementations of the same Function. Typically, only one of these implementations are used at any specific unit.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure - Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are implicitly~~qualitatively~~ credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. ~~3~~4).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy~~, (i.e. the value indicated is sufficiently close to the necessary value to ensure proper operation of the safety systems to turn the AOO).~~.

The LCO requires all instrumentation performing an ESFAS Function, listed in Table 3.3.2-1 in the accompanying LCO, to be OPERABLE. ~~A~~ The Allowable Value specified in the SCP is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE ~~with a trip setpoint value outside its calibration tolerance band provided the trip~~if the as-found setpoint ~~"as-found" value does not exceed its associated Allowable Value and provided~~is within the as-found tolerance and is conservative with respect to the Allowable Value during the CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the [NTSP] by an amount [greater than or] equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel ([NTSP]) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint ~~"as-~~must be left~~" value is~~ adjusted to a value within the ~~calibration tolerance band of the Nominal Trip Setpoint.~~ as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE, but degraded. The degraded condition of the channel will be evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel's as-found setting will be entered into the Corrective Action Program for further evaluation.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two CEACs with three or more auto restarts during a 12 hour period.	D.1 Perform CHANNEL FUNCTIONAL TEST on affected CEAC.	24 hours
E. Required Action and associated Completion Time of Condition B, C, or D not met.	E.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.3.1	Perform a CHANNEL CHECK.	12 hours
SR 3.3.3.2	Check the CEAC auto restart count.	12 hours
SR 3.3.3.3	Perform a CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.3.4	Perform a CHANNEL CALIBRATION in accordance with the Setpoint Control Program.	[18] months
SR 3.3.3.5	Perform a CHANNEL FUNCTIONAL TEST in accordance with the Setpoint Control Program.	[18] months
SR 3.3.3.6	Verify the isolation characteristics of each CEAC isolation amplifier and each optical isolator for CEAC to CPC data transfer in accordance with the Setpoint Control Program.	[18] months

5.5 Programs and Manuals

5.5.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, based on [the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," or of the battery manufacturer] including the following

a. Actions to restore battery cells with float voltage < [2.13] V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

5.5.18 Setpoint Control Program

This program shall establish the requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses, provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program shall ensure that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

a. The program shall list the Functions in the following specifications to which it applies:

1. LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation - Operating [(Analog)] [(Digital)];"
2. LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation - Shutdown [(Analog)] [(Digital)];"
3. LCO [3.3.3, "Control Element Assembly Calculators (CEACs) (Digital)];"
4. [LCO 3.3.4,"Engineered Safety Features Actuation System (ESFAS) Instrumentation (Analog);"] [LCO 3.3.5, "Engineered Safety Features Actuation System (ESFAS) Instrumentation (Digital);"]
5. [LCO 3.3.6, "Diesel Generator (DG) - Loss of Voltage Start (LOVS) (Analog);"] [LCO 3.3.7, "Diesel Generator (DG) - Loss of Voltage Start (LOVS) (Digital);"]
6. [LCO 3.3.7, "Containment Purge Isolation Signal (CPIS) (Analog);"] [LCO 3.3.8, "Containment Purge Isolation Signal (CPIS) (Digital);"]
7. [LCO 3.3.8, "Control Room Isolation Signal (CRIS) (Analog);"] [LCO 3.3.9 "Control Room Isolation Signal (CRIS) (Digital);"];
8. [LCO 3.3.9, "Chemical and Volume Control System (CVCS) Isolation Signal (Analog);"]
9. [LCO 3.3.10, "Fuel Handling Isolation Signal (FHIS) (Digital);"]
10. LCO 3.3.13, "[Logarithmic] Power Monitoring Channels [(Analog)."] [(Digital)."]

b. The program shall require the Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) (as applicable) of the Functions described in Paragraph a. are calculated using the NRC approved setpoint methodology, as listed below. In addition, the program shall contain the value of the LTSP, NTSP, AV, AFT, and ALT (as applicable) for each Function described in paragraph a. and shall identify the setpoint methodology used to calculate these values.

---------- Reviewer's Note ----------
List the NRC safety evaluation report by letter, date, and ADAMS accession number (if available) that approved the setpoint methodologies.
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1. [Insert reference to NRC safety evaluation that approved the setpoint methodology.]

c. The program shall establish methods to ensure that Functions described in Paragraph a. will function as required by verifying the as-left and as-found settings are consistent with those established by the setpoint methodology.

d. ----------REVIEWER'S NOTE----------
A license amendment request to implement a Setpoint Control Program must list the instrument functions to which the program requirements of paragraph d. will be applied. Paragraph d. shall apply to all Functions in the Reactor Protection System and Engineered Safety Feature Actuation System specifications unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or to instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The program shall identify the Functions described in Paragraph a. that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). The LTSP of these

Functions are Limiting Safety System Settings. These Functions shall be demonstrated to be functioning as required by applying the following requirements during CHANNEL CALIBRATIONS and CHANNEL FUNCTIONAL TESTS that verify the [LTSP or NTSP].

1 The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified [LTSP or NTSP].

2. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified [LTSP or NTSP] by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated before declaring the SR met and returning the instrument channel to service. This condition shall be entered in the plant corrective action program.

3. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, then the SR is not met and the instrument channel shall be immediately declared inoperable.

4. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [LTSP or NTSP] at the completion of the surveillance test; otherwise, the channel is inoperable (setpoints may be more conservative than the [LTSP or NTSP] provided that the as-found and as-left tolerances apply to the actual setpoint used to confirm channel performance).

e. The program shall be specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].~~Changes to the program shall be made in accordance with the requirements of 10 CFR 50.59. Revisions or supplements to the program shall be provided upon issuance to the NRC.~~

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Analog)

BASES

BACKGROUND

The Reactor Protective System (RPS) initiates a reactor trip to protect against violating the core specified acceptable fuel design limits and breaching the reactor coolant pressure boundary (RCPB) during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Features (ESF) systems in mitigating accidents.

The protection and monitoring systems have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include~~contain~~ LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for ~~instrument loop~~channel uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.5

A CHANNEL CALIBRATION of the excore power range channels every 92 days ensures that the channels are reading accurately and within tolerance. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. ~~CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis~~The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

~~The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the frequency extension analysis. The requirements for this review are outlined in Reference [10].~~

A Note is added stating that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2) and the monthly linear subchannel gain check (SR 3.3.1.3). In addition, associated control room indications are continuously monitored by the operators.

The Frequency of 92 days is acceptable, based on plant operating experience, and takes into account indications and alarms available to the operator in the control room.

SR 3.3.1.6

A CHANNEL FUNCTIONAL TEST on the Loss of Load and Power Rate of Change channels is performed prior to a reactor startup to ensure the entire channel will perform its intended function if required. The test is performed in accordance with the SCP. If the actual setting of the

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Surveillance is modified by a Note to indicate that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2) and the monthly linear subchannel gain check (SR 3.3.1.3).

SR 3.3.1.9

This SR ensures that the RPS RESPONSE TIMES are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the RTCBs open. Response times are conducted on an [18] month STAGGERED TEST BASIS. This results in the interval between successive surveillances of a given channel of n x 18 months, where n is the number of channels in the function. The Frequency of

[18] months is based upon operating experience, which has shown that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Also, response times cannot be determined at power, since equipment operation is required. Testing may be performed in one measurement or in overlapping segments, with verification that all components are tested.

----------REVIEWER'S NOTE----------
Applicable portions of the following TS Bases are applicable to plants adopting CEOG Topical Report CE NPSD-1167-1, "Elimination of Pressure Sensor Response Time Testing Requirements."

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 10~~11~~) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

BASES

SURVEILLANCE REQUIREMENTS (continued)

A Note is added to indicate that the neutron detectors are excluded from RPS RESPONSE TIME testing because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.2).

REFERENCES

1. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation."

2. 10 CFR 50, Appendix A, GDC 21.

3. 10 CFR 100.

4. IEEE Standard 279-1971, April 5, 1972.

5. FSAR, Chapter [14].

6. 10 CFR 50.49.

~~7. "Plant Protection System Selection of Trip Setpoint Values."~~

7~~8~~. FSAR, Section [7.2].

8~~9~~. NRC Safety Evaluation Report, [Date].

9~~10~~. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989.

~~11.~~ 10. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

B 3.3 INSTRUMENTATION

B 3.3.4 Engineered Safety Features Actuation System (ESFAS) Instrumentation (Analog)

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

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

The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

BASES

BACKGROUND (continued)

setpoint entered into the bistable is normally still more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. One example of such a change in measurement error is drift during the interval between surveillances.~~If the measured setpoint does not exceed~~is ~~conservative with respect to~~ ~~the Allowable Value, the bistable is considered OPERABLE.~~

The [LTSP] is the value at which the bistable is set and is the expected value to be achieved during calibration. The [LTSP] value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties.

[Limiting Trip Setpoints], in ~~accordance~~conjunction with the use of as-found and as-left tolerances, consistent with the requirements of the Allowable Value will ensure that Safety Limits of Chapter 2.0, "SAFETY LIMITS (SLs)," are not violated during anticipated operational occurrences (AOOs) and that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed.

Note that in the accompanying LCO 3.3.4, the Allowable Values of the SCP are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION or CHANNEL FUNCTIONAL TEST.

ESFAS Logic

It is possible to change the two-out-of-four ESFAS logic to a two-out-of-three logic for a given input parameter in one channel at a time by disabling one channel input to the logic. Thus, the bistables will function normally, producing normal trip indication and annunciation, but ESFAS actuation will not occur since the bypassed channel is effectively removed from the coincidence logic. Trip channel bypassing can be simultaneously performed on any number of parameters in any number of channels, providing each parameter is bypassed in only one channel at a time. At some plants an interlock prevents simultaneous trip channel bypassing of the same parameter in more than one channel. Trip channel bypassing is normally employed during maintenance or testing.

ESFAS Logic is addressed in LCO 3.3.5.

APPLICABLE SAFETY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Digital)

BASES

BACKGROUND

The ~~RPS~~Reactor Protective System (RPS) initiates a reactor trip to protect against violating the core specified acceptable fuel design limits and breaching the reactor coolant pressure boundary (RCPB) during ~~anticipated operational occurrences~~Anticipated Operational Occurrences (AOOs). By tripping the reactor, the RPS also assists the Engineered Safety Features (ESF) systems in mitigating accidents.

The protection and monitoring systems have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include~~contain~~ LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for ~~instrument loop~~channel uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.10

SR 3.3.1.10 is the performance of a CHANNEL CALIBRATION every [18] months.

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive tests. ~~CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis~~The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

~~The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [10].~~

The Frequency is based upon the assumption of an [18] month calibration interval for the determination of the magnitude of equipment drift in the setpoint analysis as well as operating experience and consistency with the typical [18] month fuel cycle.

The Surveillance is modified by a Note to indicate that the neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4) and the monthly linear subchannel gain check (SR 3.3.1.6).

SR 3.3.1.11

Every [18] months, a CHANNEL FUNCTIONAL TEST is performed on the CPCs. The CHANNEL FUNCTIONAL TEST shall include the injection of

BASES

SURVEILLANCE REQUIREMENTS (continued)

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 10~~11~~) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

A Note is added to indicate that the neutron detectors are excluded from RPS RESPONSE TIME testing because they are passive devices~~channels~~ with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4).

REFERENCES

1. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation."

2. 10 CFR 50, Appendix A, GDC 21.

3. 10 CFR 100.

4. NRC Safety Evaluation Report.

5. IEEE Standard 279-1971, April 5, 1972.

6. FSAR, Chapter [14].

7. 10 CFR 50.49.

~~8. "Plant Protection System Selection of Trip Setpoint Values."~~

8~~9~~. FSAR, Section [7.2].

9~~10~~. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989.

10~~11~~. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

the as-left and as-found setting are consistent with those established by the setpoint methodology.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.3.4

SR 3.3.3.4 is the performance of a CHANNEL CALIBRATION every [18] months.

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive surveillances. ~~CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis~~The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

~~The as-found and as-left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference [5].~~

The Frequency is based upon the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis and includes operating experience and consistency with the typical [18] month fuel cycle.

SR 3.3.3.5

Every [18] months, a CHANNEL FUNCTIONAL TEST is performed on the CEACs. The CHANNEL FUNCTIONAL TEST shall include the injection of a signal as close to the sensors as practicable to verify OPERABILITY, including alarm and trip Functions. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

B 3.3 INSTRUMENTATION

B 3.3.5 Engineered Safety Features Actuation System (ESFAS) Instrumentation (Digital)

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and ensures acceptable consequences during accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for channel uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

BASES

BACKGROUND (continued)

The trip setpoints and Allowable Values used in the bistables are ~~based on~~derived from the analytical limits stated in Reference ~~5.~~9. The selection~~calculation~~ of these trip setpoints~~the Limiting Trip Setpoint specified in the SCP~~ is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment effects, for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. ~~6~~8), Allowable Values specified in ~~Table 3.3.5-1~~the SCP, in the accompanying LCO, are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the trip setpoints, including their explicit uncertainties, is provided in the ~~"Plant Protection System Selection of Trip Setpoint Values" (Ref. 7).~~SCP. The actual ~~nominal~~ trip setpoint entered into the bistable is normally still more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. One example of such a change in measurement error is drift during the interval between surveillances. ~~A channel is inoperable if its actual trip~~~~If the measured setpoint is not within its required~~~~the as-found tolerance and is conservative with respect to the Allowable Value, the bistable is considered OPERABLE~~.

The [LTSP] is the value at which the bistable is set and is the expected value to be achieved during calibration. The [LTSP] value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties.

[Limiting Trip Setpoints], in ~~accordance~~conjunction with the use of as-found and as-left tolerances, consistent with the requirements of the Allowable Value will ensure that Safety Limits of LCO Section 2.0, "Safety Limits," are not violated during AOOs and the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed.

Note that in the accompanying LCO 3.3.5, the Allowable Values of the SCP are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION or CHANNEL FUNCTIONAL TEST.

Functional testing of the ESFAS, from the bistable input through the opening of initiation relay contacts in the ESFAS Actuation Logic, can be performed either at power or at shutdown and is normally performed on a quarterly basis. FSAR, Section [7.2] (Ref. ~~8~~10), provides more detail on ESFAS testing. Process transmitter calibration is normally performed on

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.6.1.3	[Calibrate the trip unit in accordance with the Setpoint Control Program.	[92] days]
SR 3.3.6.1.4	Perform CHANNEL CALIBRATION in accordance with the Setpoint Control Program.	92 days
SR 3.3.6.1.5	[Perform CHANNEL FUNCTIONAL TEST ~~in accordance with the Setpoint Control Program.~~	[184] days]
SR 3.3.6.1.6	Perform CHANNEL CALIBRATION in accordance with the Setpoint Control Program.	[18] months
SR 3.3.6.1.7	Perform LOGIC SYSTEM FUNCTIONAL TEST.	[18] months
----------REVIEWER'S NOTE---------- This SR is applied only to Functions of Table 3.3.6.1-1 with required response times not corresponding to DG start time. ----------		
SR 3.3.6.1.8	----------NOTE---------- [Radiation detectors may be excluded.] ---------- Verify the ISOLATION SYSTEM RESPONSE TIME is within limits.	[18] months on a STAGGERED TEST BASIS

5.5 Programs and Manuals

5.5.14 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, based on [the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," or of the battery manufacturer] of the following:

a. Actions to restore battery cells with float voltage < [2.13] V, and

b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

5.5.15 Setpoint Control Program

This program shall establish the requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses, provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program shall ensure that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

a. The program shall list the Functions in the following specifications to which it applies:

1. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation;"
2. LCO 3.3.1.2, "Source Range Monitor (SRM) Instrumentation;"
3. LCO 3.3.2.1, "Control Rod Block Instrumentation;"
4. LCO 3.3.2.2, "Feedwater and Main Turbine High Water Level Trip Instrumentation;"
5. LCO 3.3.4.1, "End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation;"
6. LCO 3.3.4.2, " Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation;"
7. LCO 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation;"
8. LCO 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation;"
9. LCO 3.3.6.1, "Primary Containment Isolation Instrumentation;"
10. LCO 3.3.6.2, "Secondary Containment Isolation Instrumentation;"
11. LCO 3.3.6.3, "Low-Low Set (LLS) Instrumentation;"
12. LCO 3.3.7.1, "[Main Control Room Environmental Control (MCREC)] System Instrumentation;"
13. LCO 3.3.8.1, "Loss of Power (LOP) Instrumentation;"
14. LCO 3.3.8.2, "Reactor Protection System (RPS) Electric Power Monitoring."

b. The program shall require the Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) (as applicable) of the Functions described in Paragraph a. are calculated using the NRC approved setpoint methodology, as listed below. In addition, the program shall contain the value of the LTSP, NTSP, AV, AFT, and ALT (as applicable) for each Function described in paragraph a. and shall identify the setpoint methodology used to calculate these values.

---------- Reviewer's Note ----------
List the NRC safety evaluation report by letter, date, and ADAMS accession number (if available) that approved the setpoint methodologies.
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1. [Insert reference to NRC safety evaluation that approved the setpoint methodology.]

c. The program shall establish methods to ensure that Functions described in Paragraph a. will function as required by verifying the as-left and as-found settings are consistent with those established by the setpoint methodology.

d. ---------- REVIEWER'S NOTE ----------
A license amendment request to implement a Setpoint Control Program must list the instrument functions to which the program requirements of paragraph d. will be applied. Paragraph d. shall apply to all Functions in the Reactor Protection System (RPS) Instrumentation, Control Rod Block Instrumentation, End of Cycle-Recirculation Pump Trip (EOC-RPT) Instrumentation, Emergency Core Cooling System (ECCS) Instrumentation, and Reactor Core Isolation Cooling (RCIC) instrumentation specifications unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or to instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The program shall identify the Functions described in Paragraph a. that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). The LTSP of these Functions are Limiting Safety System Settings. These Functions shall be demonstrated to be functioning as required by applying the following requirements during CHANNEL CALIBRATIONS, trip unit calibrations and CHANNEL FUNCTIONAL TESTS that verify the [LTSP or NTSP].

1. The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified [LTSP or NTSP].

2. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified [LTSP or NTSP] by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated before declaring the SR met and returning the instrument channel to service. This condition shall be entered in the plant corrective action program.

3. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, then the SR is not met and the instrument channel shall be immediately declared inoperable.

4. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [LTSP or NTSP] at the completion of the surveillance test; otherwise, the channel is inoperable (setpoints may be more conservative than the [LTSP or NTSP] provided that the as-found and as-left tolerances apply to the actual setpoint used to confirm channel performance).

e. The program shall be specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]~~Changes to the program shall be made in accordance with the requirements of 10 CFR 50.59. Revisions or supplements to the program shall be provided upon issuance to the NRC~~.

B 3.3 INSTRUMENTATION

B 3.3.1.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limits, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS) and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~contain~~include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as ~~"...settings for automatic protective devices...so~~"Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The ~~Analytic~~Analytical Limit is the limit of the process variable at which a ~~safety~~protective action is initiated, as established by the safety analysis, to ensure that a safety limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic ~~protective devices~~protection channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The OPERABILITY of the RPS is dependent on the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.1.1-1. Each Function must have a required number of OPERABLE channels per RPS trip system, with their setpoints set within the ~~specified Allowable Value,~~setting tolerance of the [LTSPs], where appropriate. The actual setpoint is calibrated consistent with ~~applicable setpoint methodology assumptions~~the SCP. Each channel must also respond within its assumed response time.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Allowable Values for RPS Instrumentation Functions are specified ~~for each RPS Function specified~~ in the ~~Table. Nominal trip setpoints~~SCP. [Limiting Trip Setpoints] and the methodologies for calculation of the as-left and as-found tolerances are ~~specified~~described in the ~~setpoint calculations.~~ SCP controlled under 10 CFR 50.59. The ~~nominal setpoints~~[LTSPs] are selected to ensure that the actual setpoints ~~do not exceed the Allowable Value~~remain conservative with respect to the as-found tolerance band between successive CHANNEL CALIBRATIONS. ~~Operation with a~~ After each calibration the trip setpoint ~~less conservative than the nominal trip setpoint, but~~shall be left within ~~its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.~~the as-left band around the [LTSP].

~~Trip setpoints~~[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined accounting for the remaining instrument errors (e.g., drift). The ~~trip setpoints~~[LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The OPERABILITY of scram pilot valves and associated solenoids, backup scram valves, and SDV valves, described in the Background section, are not addressed by this LCO.

The individual Functions are required to be OPERABLE in the MODES specified in the table, which may require an RPS trip to mitigate the consequences of a design basis accident or transient. To ensure a

BASES

SURVEILLANCE REQUIREMENTS (continued)

As noted, SR 3.3.1.1.4 is not required to be performed when entering MODE 2 from MODE 1, since testing of the MODE 2 required IRM and APRM Functions cannot be performed in MODE 1 without utilizing jumpers, lifted leads, or movable links. This allows entry into MODE 2 if the 7 day Frequency is not met per SR 3.0.2. In this event, the SR must be performed within 12 hours after entering MODE 2 from MODE 1. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

A Frequency of 7 days provides an acceptable level of system average unavailability over the Frequency interval and is based on reliability analysis (Ref. ~~9~~10).

SR 3.3.1.1.5

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended ~~function~~ Function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. In accordance with Reference 10, the scram contacts must be tested as part of the Manual Scram Function. A Frequency of 7 days provides an acceptable level of system average availability over the Frequency and is based on the reliability analysis of Reference ~~11.~~10. (The Manual Scram Function's CHANNEL FUNCTIONAL TEST Frequency was credited in the analysis to extend many automatic scram Functions' Frequencies.)

SR 3.3.1.1.6

LPRM gain settings are determined from the local flux profiles measured by the Traversing Incore Probe (TIP) System. This establishes the relative local flux profile for appropriate representative input to the APRM System. The 1000 MWD/T Frequency is based on operating experience with LPRM sensitivity changes.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.7 and SR 3.3.1.1.10

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. ~~Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology. The 92 day Frequency of SR 3.3.1.1.7 is based on the reliability analysis of Reference 10.~~

A Note states that SR 3.3.1.1.7 for Function 3.3.1.1-1.2.d must be performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The 92 day Frequency of SR 3.3.1.1.7 is based on the reliability analysis of Reference 10.

The 18 month Frequency of SR 3.3.1.1.10 is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.8

~~Calibration~~The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in ~~Table 3.3.1.1-1. If the trip setting is discovered to be less conservative~~

The Average Power Range Monitor Flow Biased Simulated Thermal Power - High Function uses an electronic filter circuit to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This filter circuit is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. ~~The Surveillance filter time constant must be verified to be ≤ 7 seconds to ensure that the channel is accurately reflecting the desired parameter.~~ The filter time constant must be verified consistent with the SCP to ensure that the channel is accurately reflecting the desired parameter. The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The Frequency of 18 months is based on engineering judgment considering the reliability of the components.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.13

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The functional testing of control rods (LCO 3.1.3), and SDV vent and drain valves (LCO 3.1.8), overlaps this Surveillance to provide complete testing of the assumed safety function.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.14

This SR ensures that scrams initiated from the Turbine Stop Valve - Closure and Turbine Control Valve Fast Closure, Trip Oil Pressure - Low Functions will not be inadvertently bypassed when THERMAL POWER is ≥ 30% RTP. This involves calibration of the bypass channels. Adequate

B 3.3 INSTRUMENTATION

B 3.3.2.1 Control Rod Block Instrumentation

BASES

BACKGROUND

Control rods provide the primary means for control of reactivity changes. Control rod block instrumentation includes channel sensors, logic circuitry, switches, and relays that are designed to ensure that specified fuel design limits are not exceeded for postulated transients and accidents. During high power operation, the rod block monitor (RBM) provides protection for control rod withdrawal error events. During low power operations, control rod blocks from the rod worth minimizer (RWM) enforce specific control rod sequences designed to mitigate the consequences of the control rod drop accident (CRDA). During shutdown conditions, control rod blocks from the Reactor Mode Switch - Shutdown Position Function ensure that all control rods remain inserted to prevent inadvertent criticalities.

The protection and monitoring functions of the control rod block instrumentation has been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin

has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [Limiting Trip Setpoint (LTSP)] specified in the SCP, is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Values specified in the SCP serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as found" setting of the protection channel. Therefore, the channel

setpoints remain conservative with respect to the as-found tolerance band between successive CHANNEL CALIBRATIONS. After each calibration the trip setpoint shall be left within the as-left band around the [LTSP].

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined accounting for the remaining instrument errors (e.g., drift). The [LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. Rod Block Monitor

The RBM is designed to prevent violation of the MCPR SL and the cladding 1% plastic strain fuel design limit that may result from a single control rod withdrawal error (RWE) event. The analytical methods and assumptions used in evaluating the RWE event are summarized in Reference ~~3.~~4. A statistical analysis of RWE events was performed to determine the RBM response for both channels for each event. From these responses, the fuel thermal performance as a function of RBM Allowable Value was determined. The Allowable Values are chosen as a function of power level. Based on the specified Allowable Values, operating limits are established.

The RBM Function satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

Two channels of the RBM are required to be OPERABLE, with their setpoints within the appropriate Allowable Value for the associated power range, to ensure that no single instrument failure can preclude a rod block from this Function. The actual setpoints are calibrated consistent with applicable setpoint methodology.

B 3.3 INSTRUMENTATION

B 3.3.4.1 End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation

BASES

BACKGROUND

The EOC-RPT instrumentation initiates a recirculation pump trip (RPT) to reduce the peak reactor pressure and power resulting from turbine trip or generator load rejection transients to provide additional margin to core thermal MCPR Safety Limits (SLs).

The need for the additional negative reactivity in excess of that normally inserted on a scram reflects end of cycle reactivity considerations. Flux shapes at the end of cycle are such that the control rods may not be able to ensure that thermal limits are maintained by inserting sufficient negative reactivity during the first few feet of rod travel upon a scram caused by Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure - Low or Turbine Stop Valve (TSV) - Closure. The physical phenomenon involved is that the void reactivity feedback due to a pressurization transient can add positive reactivity at a faster rate than the control rods can add negative reactivity.

The protection functions of the EOC-RPT have been designed to ensure safe operation of the reactor during load rejection transients. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the EOC-RPT, as well as LCOs on other system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the Safety Limit (SL) is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-

specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [Limiting Trip Setpoint (LTSP)] specified in the SCP is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in the SCP serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint

B 3.3 INSTRUMENTATION

B 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

BASES

BACKGROUND

The purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure that the fuel is adequately cooled in the event of a design basis accident or transient. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ECCS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. Trip setpoints~~ [LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device~~device~~~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The ~~trip setpoints~~[LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS (or DG) initiation to mitigate the consequences of a design basis transient or accident. To ensure reliable ECCS and DG function, a combination of Functions is required to provide primary and secondary initiation signals.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level - Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated DGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients analyzed in References ~~1~~2 and ~~3.~~4. In addition, the Reactor Vessel Water Level - Low Low Low, Level 1 Function is directly assumed in the analysis of the recirculation line break (Ref. ~~2~~3). The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

BASES

BACKGROUND

The purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the reactor vessel is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that initiation of the low pressure Emergency Core Cooling Systems (ECCS) pumps does not occur. A more complete discussion of RCIC System operation is provided in the Bases of LCO 3.5.3, "RCIC System." This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RCIC, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.
The LSSS values are identified and maintained in the Setpoint Control Program (SPC) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint ~~less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Each Allowable Value specified accounts for~~, the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties ~~appropriate to the Function. These uncertainties are described in the setpoint methodology~~, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The individual Functions are required to be OPERABLE in MODE 1, and in MODES 2 and 3 with reactor steam dome pressure > 150 psig since this is when RCIC is required to be OPERABLE. (Refer to LCO 3.5.3 for Applicability Bases for the RCIC System.)

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.1.2 and SR 3.3.6.1.5

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

~~The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.~~
Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The 92 day Frequency of SR 3.3.6.1.2 is based on the reliability analysis described in References 6 and 7. The 184 day Frequency of SR 3.3.6.1.5 is based on engineering judgment and the reliability of the components (time delay relays exhibit minimal drift).

SR 3.3.6.1.3

Calibration of trip units provides a check of the actual trip setpoints. ~~The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.6.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than that accounted for in the appropriate~~The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of References 5 and 6.

SR 3.3.6.1.4 and SR 3.3.6.1.6

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. Refer to Table 3.3.2.1-1 to determine which SRs apply for each Control Rod Block Function.

2. When an RWL channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains control rod block capability.

SURVEILLANCE		FREQUENCY
SR 3.3.2.1.1	----------NOTE---------- Not required to be performed until 1 hour after THERMAL POWER is > [70]% RTP. ---------- Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.2.1.2	----------NOTE---------- Not required to be performed until 1 hour after THERMAL POWER is > 35% RTP and ≤ 70% RTP. ---------- Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.2.1.3	----------NOTE---------- Not required to be performed until 1 hour after any control rod is withdrawn at ≤ [10]% RTP in MODE 2. ---------- Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.2.1.4	----------NOTE---------- Not required to be performed until 1 hour after THERMAL POWER is ≤ [10]% RTP in MODE 1. ---------- Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.2.1.5	Calibrate the trip unit <u>in accordance with the Setpoint Control Program</u>.	92 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Required Action and associated Completion Time of Condition B, C, D, E, F, or G not met.	H.1 Declare associated supported feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. Refer to Table 3.3.5.1-1 to determine which SRs apply for each ECCS Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed as follows: (a) for up to 6 hours for Functions 3.c, 3.f, 3.g, and 3.h; and (b) for up to 6 hours for Functions other than 3.c, 3.f, 3.g, and 3.h, provided the associated Function or the redundant Function maintains ECCS initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.5.1.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.5.1.2	Perform CHANNEL FUNCTIONAL TEST.	[92] days
SR 3.3.5.1.3	[Calibrate the trip unit in accordance with the Setpoint Control Program.	[92] days]
SR 3.3.5.1.4	[Perform CHANNEL CALIBRATION in accordance with the Setpoint Control Program.	92 days]
SR 3.3.5.1.5	Perform CHANNEL CALIBRATION in accordance with the Setpoint Control Program.	[18] months
SR 3.3.5.1.6	Perform LOGIC SYSTEM FUNCTIONAL TEST.	[18] months
SR 3.3.5.1.7	Verify the ECCS RESPONSE TIME is within limits.	[18] months on a STAGGERED

B 3.3 INSTRUMENTATION

B 3.3.1.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limit, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS), and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters, and equipment performance. Technical Specifications are required by 10 CFR 50.36 to contain LSSS defined by the regulation as "...settings for automatic protective devices...so chosen that automatic protective action will correct the abnormal situation before a Safety Limit (SL) is exceeded." ~~The Analytic Limit is the limit of the process variable at which a safety~~

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. . LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protective ~~devices~~channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [LTSP] specified in the SCP, is a predetermined setting for a ~~protective device~~protection channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [LTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[LTSP] ensures that SLs are not exceeded. As such, the ~~trip setpoint~~[LTSP] meets the definition of an LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." ~~For automatic protective devices,~~Relying solely on the ~~required safety function is to ensure that a SL is not exceeded and therefore the LSSS as defined by 10 CFR 50.36 is the same as the OPERABILITY limit for these devices. However, use of the trip setpoint~~[LTSP] to define OPERABILITY in Technical Specifications~~ and its corresponding designation as the LSSS required by 10 CFR 50.36~~ would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a ~~protective device~~protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic ~~protective device~~protection channel with a setting that has been found to be different from the ~~trip setpoint~~[LTSP] due to some drift of the setting may still be OPERABLE ~~since~~because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the ~~trip setpoint~~[LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as found" setting of the ~~protective device.~~protection channel. Therefore, the

~~device~~channel would still be OPERABLE ~~since~~because it would have performed its safety function and the only corrective action required would be to reset the ~~device to the trip setpoint~~ channel within the established as-left tolerance around the [LTSP] to account for further drift during the next surveillance interval.

~~Use of the trip setpoint to define "as found" OPERABILITY and its designation as the LSSS under the expected circumstances described above would result in actions required by both the rule and Technical Specifications that are clearly not warranted. However, there is also some point beyond which the device would have not been able to perform its function due, for example, to greater than expected drift. This value needs to be specified in the Technical Specifications in order to define OPERABILITY of the devices and is designated as the Allowable Value which, as stated above, is the same as the LSSS.~~

~~The Allowable Valuable specified in Table 3.3.1-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this~~

BASES

BACKGROUND (continued)

~~manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval. If the actual setting of the device is found to have exceeded the Allowable Value the device would be considered inoperable from a Technical Specification perspective. This requires corrective action including those actions required by 10 CFR 50.36 when automatic protective devices do not function as required.~~ Note that, although the channel is "OPERABLE" under these circumstances, the trip setpoint ~~should~~must be left adjusted to a value within the ~~established trip setpoint calibration~~as-left tolerance~~ band,~~, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned~~.~~ (as-found criteria).

However, there is also some point beyond which the channel may not be able to perform its function due to, for example, greater than expected drift. This value needs to be specified in the Technical Specifications in order to define OPERABILITY of the channels and is designated as the Allowable Value.

If the actual setting (as-found setpoint) of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE, but degraded. The degraded condition will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [LTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The RPS, as shown in the FSAR, Figure [ ] (Ref. 2), includes sensors, relays, bypass circuits, and switches that are necessary to cause initiation of a reactor scram. Functional diversity is provided by monitoring a wide range of dependent and independent parameters. The input parameters to the scram logic are from instrumentation that monitors reactor vessel water level, reactor vessel pressure, neutron flux main steam line isolation valve position, turbine control valve (TCV) fast closure trip oil pressure low, turbine stop valve (TSV) trip oil pressure low, drywell pressure and scram discharge volume (SDV) water level, as well as reactor mode switch in shutdown position and manual scram signals. There are at least four redundant sensor input signals from each of these parameters (with the exception of the reactor mode switch in shutdown

scram signal). Most channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When ~~a~~the setpoint is exceeded, the channel output relay actuates, which then outputs an RPS trip signal to the trip logic. Table B 3.3.1.1-1 summarizes the diversity of sensors capable of initiating scrams during anticipated operating transients typically analyzed.

The RPS is comprised of two independent trip systems (A and B), with two logic channels in each trip system (logic channels A1 and A2, B1 and B2), as shown in Reference 2. The outputs of the logic channels in a trip system are combined in a one-out-of-two logic so either channel can trip the associated trip system. The tripping of both trip systems will produce a reactor scram. This logic arrangement is referred to as one-out-of-two taken twice logic. Each trip system can be reset by use of a reset switch. If a full scram occurs (both trip systems trip), a relay prevents reset of the trip systems for 10 seconds after the full scram signal is received. This 10 second delay on reset ensures that the scram function will be completed.

BASES

BACKGROUND (continued)

Two scram pilot valves are located in the hydraulic control unit (HCU) for each control rod drive (CRD). Each scram pilot valve is solenoid operated, with the solenoids normally energized. The scram pilot valves control the air supply to the scram inlet and outlet valves for the associated CRD. When either scram pilot valve solenoid is energized, air pressure holds the scram valves closed and, therefore, both scram pilot valve solenoids must be de-energized to cause a control rod to scram. The scram valves control the supply and discharge paths for the CRD water during a scram. One of the scram pilot valve solenoids for each CRD is controlled by trip system A, and the other solenoid is controlled by trip system B. Any trip of trip system A in conjunction with any trip in trip system B results in de-energizing both solenoids, air bleeding off, scram valves opening, and control rod scram.

The backup scram valves, which energize on a scram signal to depressurize the scram air header, are also controlled by the RPS. Additionally, the RPS System controls the SDV vent and drain valves such that when both trip systems trip, the SDV vent and drain valves close to isolate the SDV.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The actions of the RPS are assumed in the safety analyses of References 3, 4, and 5. The RPS initiates a reactor scram when monitored parameter values are exceeded ~~exceed the Allowable Values specified by the setpoint methodology and listed in Table 3.3.1.1-1~~ to preserve the integrity of the fuel cladding, the reactor coolant pressure boundary (RCPB), and the containment by minimizing the energy that must be absorbed following a LOCA.

RPS instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii). Functions not specifically credited in the accident analysis are retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The OPERABILITY of the RPS is dependent on the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.1.1-1.

Each Function must have a required number of OPERABLE channels per RPS trip system, with their setpoints set within the ~~specified Allowable Value,~~setting tolerance of the [LTSPs], where appropriate. The actual setpoint is calibrated consistent with ~~applicable setpoint methodology assumptions~~the SCP. Each channel must also respond within its assumed response time.

Allowable Values for RPS Instrumentation Functions are specified ~~for each RPS Function specified~~ in the ~~Table. Nominal trip setpoints~~SCP. [Limiting Trip Setpoints] and the methodologies for calculation of the as-left and as-found tolerances are ~~specified~~described in the ~~setpoint calculations~~SCP controlled under 10 CFR 50.59. The ~~nominal setpoints~~[LTSPs] are selected to ensure that the actual setpoints ~~do not exceed the Allowable Value~~remain conservative with respect to the as-found tolerance band between successive CHANNEL CALIBRATIONS. ~~Operation with a~~After each calibration the trip setpoint ~~less conservative than the nominal trip setpoint, but~~shall be left within ~~its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.~~the as-left band around the [LTSP].

~~Trip setpoints~~[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device (e.g., trip unit) changes state. The ~~analytic limits~~Analytical Limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The ~~trip setpoints~~[LTSPs] derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The OPERABILITY of scram pilot valves and associated solenoids, backup scram valves, and SDV valves, described in the Background section, are not addressed by this LCO.

The individual Functions are required to be OPERABLE in the MODES specified in the Table that may require an RPS trip to mitigate the consequences of a design basis accident or transient. To ensure a reliable scram function, a combination of Functions is required in each MODE to provide primary and diverse initiation signals.

RPS is required to be OPERABLE in MODE 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies. Control rods withdrawn from a core cell containing no fuel assemblies do not affect the reactivity of the core and therefore are not required to have

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Average Power Range Monitor Fixed Neutron Flux - High Function is required to be OPERABLE in MODE 1 where the potential consequences of the analyzed transients could result in the SLs (e.g., MCPR and RCS pressure) being exceeded. Although the Average Power Range Monitor Fixed Neutron Flux - High Function is assumed in the CRDA analysis that is applicable in MODE 2, the Average Power Range Monitor Neutron Flux - High, Setdown Function conservatively bounds the assumed trip and, together with the assumed IRM trips, provides adequate protection. Therefore, the Average Power Range Monitor Fixed Neutron Flux - High Function is not required in MODE 2.

2.d. Average Power Range Monitor - Inop

This signal provides assurance that a minimum number of APRMs are OPERABLE. Anytime an APRM mode switch is moved to any position other than Operate, an APRM module is unplugged, the electronic operating voltage is low, or the APRM has too few LPRM inputs (< 11), an inoperative trip signal will be received by the RPS, unless the APRM is bypassed. Since only one APRM in each trip system may be bypassed, only one APRM in each trip system may be inoperable without resulting in an RPS trip signal. This Function was not specifically credited in the accident analysis, but it is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Four channels of Average Power Range Monitor - Inop with two channels in each trip system are required to be OPERABLE to ensure that no single failure will preclude a scram from this Function on a valid signal.

There is no Allowable Value for this Function.

This Function is required to be OPERABLE in the MODES where the APRM Functions are required.

3. Reactor Vessel Steam Dome Pressure - High

An increase in the RPV pressure during reactor operation compresses the steam voids and results in a positive reactivity insertion. This causes the neutron flux and THERMAL POWER transferred to the reactor coolant to increase, which could challenge the integrity of the fuel cladding and the RCPB. No specific safety analysis takes direct credit for this Function. However, the Reactor Vessel Steam Dome Pressure - High Function initiates a scram for transients that results in a pressure increase, counteracting the pressure increase by rapidly reducing core

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

ASME Code limits. That is, the direct scram on position switches for MSIV closure events is not assumed in the overpressurization analysis. Additionally, MSIV closure is assumed in the transients analyzed in Reference 5 (e.g., low steam line pressure, manual closure of MSIVs, high steam line flow). The reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the ECCS, ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

MSIV closure signals are initiated from position switches located on each of the eight MSIVs. Each MSIV has two position switches; one inputs to RPS trip system A while the other inputs to RPS trip system B. Thus, each RPS trip system receives an input from eight Main Steam Isolation Valve - Closure channels, each consisting of one position switch. The logic for the Main Steam Isolation Valve - Closure Function is arranged such that either the inboard or outboard valve on three or more of the main steam lines (MSLs) must close in order for a scram to occur.

The Main Steam Isolation Valve - Closure Allowable Value is specified to ensure that a scram occurs prior to a significant reduction in steam flow, thereby reducing the severity of the subsequent pressure transient.

Sixteen channels of the Main Steam Isolation Valve - Closure Function with eight channels in each trip system are required to be OPERABLE to ensure that no single instrument failure will preclude the scram from this Function on a valid signal. This Function is only required in MODE 1 since, with the MSIVs open and the heat generation rate high, a pressurization transient can occur if the MSIVs close. In MODE 2, the heat generation rate is low enough so that the other diverse RPS functions provide sufficient protection.

7. Drywell Pressure - High

High pressure in the drywell could indicate a break in the RCPB. A reactor scram is initiated to minimize the possibility of fuel damage and to reduce the amount of energy being added to the coolant and the drywell. The Drywell Pressure - High Function is a secondary scram signal to Reactor Vessel Water Level - Low, Level 3 for LOCA events inside the drywell. ~~This Function was not specifically credited in the accident analysis, but it~~The value is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

BASES

SURVEILLANCE REQUIREMENTS (continued)

As noted at the beginning of the SRs, the SRs for each RPS ~~instrumentation~~instrument Function are located in the SRs column of Table 3.3.1.1-1.

The Surveillances are modified by a Note to indicate that, when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the RPS reliability analysis (Ref. 10) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

SR 3.3.1.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift on one of the channels or something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit.

The agreement criteria includes an expectation of one decade of overlap when transitioning between neutron flux instrumentation. The overlap between SRMs and IRMs must be demonstrated prior to withdrawing SRMs from the fully inserted position since indication is being transitioned from the SRMs to the IRMs. This will ensure that reactor power will not be increased into a neutron flux region without adequate indication. The overlap between IRMs and APRMs is of concern when reducing power into the IRM range (entry into MODE 2 from MODE 1). On power

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.7 and SR 3.3.1.1.10

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The 92 day Frequency of SR 3.3.1.1.7 is based on the reliability analysis of Reference 10.

The 18 month Frequency of SR 3.3.1.1.10 is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.8

The calibration of trip units provides a check of the actual trip setpoints. ~~The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.1.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than accounted for in the appropriate setpoint methodology~~The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the

channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The Frequency of 92 days for SR 3.3.1.1.8 is based on the reliability analysis of Reference 10.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.9 and SR 3.3.1.1.11

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. ~~CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology~~The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

Note 1 states that neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices, with minimal drift, and because of the difficulty of simulating a meaningful signal. Changes in neutron detector sensitivity are compensated for by performing the 7 day calorimetric calibration (SR 3.3.1.1.2) and the 1000 MWD/T LPRM calibration against the TIPs (SR 3.3.1.1.6). A second Note is provided that requires the APRM and IRM SRs to be performed within 12 hours of entering MODE 2 from MODE 1. Testing of the MODE 2 APRM and IRM Functions cannot be performed in MODE 1 without utilizing jumpers, lifted leads, or movable links. This Note allows entry into MODE 2 from MODE 1 if the associated Frequency is not met per SR 3.0.2. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

The Frequency of SR 3.3.1.1.9 is based upon the assumption of a 184 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.1.1.11 is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.1.1.12

The Average Power Range Monitor Flow Biased Simulated Thermal Power - High Function uses an electronic filter circuit to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This filter circuit is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. ~~The filter time constant must be verified to ensure that the channel is accurately reflecting the desired parameter~~The filter time constant must be verified consistent with the SCP to ensure that the channel is accurately reflecting the desired parameter. The test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The Frequency of 18 months is based on engineering judgment and reliability of the components.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.15

This SR ensures that the individual channel response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 11.

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements.

[----------REVIEWER'S NOTE----------
The following Bases are applicable for plants adopting NEDO-32291-A and/or Supplement 1.

However, the sensors for Functions 3, 4, and 5 are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference 12 are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference 12 are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response times for Functions 3, 4, and 5 is not required if the conditions of Reference 13 are satisfied.]

As noted, neutron detectors are excluded from RPS RESPONSE TIME testing because the principles of detector operation virtually ensure an instantaneous response time.

RPS RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Note 2 requires STAGGERED TEST BASIS Frequency to be determined based on 4 channels per trip system, in lieu of the 8 channels specified in Table 3.3.1.1-1 for the MSIV Closure Function. This Frequency is based on the logic interrelationships of the various channels required to produce an RPS scram signal. Therefore, staggered testing results in response time verification of these ~~devices~~channels every 18 months. The 18 month Frequency is consistent with the typical industry refueling cycle and is based upon plant operating experience, which shows that random failures of instrumentation components causing serious time degradation, but not channel failure, are infrequent.

5.5 Programs and Manuals

5.5.15 Setpoint Control Program

This program shall establish the requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses, provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program shall ensure that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

a. The program shall list the Functions in the following specifications to which it applies:

1. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation;"
2. LCO 3.3.1.2, "Source Range Monitor (SRM) Instrumentation;"
3. LCO 3.3.2.1, "Control Rod Block Instrumentation;"
4. LCO 3.3.2.2, "Feedwater and Main Turbine High Water Level Trip Instrumentation;"
5. LCO 3.3.4.1, "End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation;"
6. LCO 3.3.4.2, "Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation;"
7. LCO 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation;"
8. LCO 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation;"
9. LCO 3.3.6.1, "Primary Containment Isolation Instrumentation;"
10. LCO 3.3.6.2, "Secondary Containment Isolation Instrumentation;"
11. LCO 3.3.6.3, "Low-Low Set (LLS) Instrumentation;"
12. LCO 3.3.7.1, "[Main Control Room Environmental Control (MCREC)] System Instrumentation;"
13. LCO 3.3.8.1, "Loss of Power (LOP) Instrumentation;" and
14. LCO 3.3.8.2, "Reactor Protection System (RPS) Electric Power Monitoring."

b. The program shall require the Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint (NTSP), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) (as applicable) of the Functions described in Paragraph a. are calculated using the NRC approved setpoint methodology, as listed below. In addition, the program shall contain the value of the LTSP, NTSP, AV, AFT, and ALT (as applicable) for each Function described in paragraph a. and shall identify the setpoint methodology used to calculate these values.

---------- Reviewer's Note ----------
List the NRC safety evaluation report by letter, date, and ADAMS accession number (if available) that approved the setpoint methodologies.
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1. [Insert reference to NRC safety evaluation that approved the setpoint methodology.]

c. The program shall establish methods to ensure that Functions described in Paragraph a. will function as required by verifying the as-left and as-found settings are consistent with those established by the setpoint methodology.

d. ---------- REVIEWER'S NOTE ----------
A license amendment request to implement a Setpoint Control Program must list the instrument functions to which the program requirements of paragraph d. will be applied. Paragraph d. shall apply to all Functions in the Reactor Protection System (RPS) Instrumentation, Control Rod Block Instrumentation, End of Cycle-Recirculation Pump Trip (EOC-RPT) Instrumentation, Emergency Core Cooling System (ECCS) Instrumentation, Reactor Core Isolation Cooling (RCIC) Instrumentation and Relief and Low-Low Set (LLS) Instrumentation specifications unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or to instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

The program shall identify the Functions described in Paragraph a. that are automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A). The LTSP of these Functions are Limiting Safety System Settings. These Functions shall be demonstrated to be functioning as required by applying the following requirements during CHANNEL CALIBRATIONS, trip unit calibrations and CHANNEL FUNCTIONAL TESTS that verify the [LTSP or NTSP].

1 The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified [LTSP or NTSP].

2. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified [LTSP or NTSP] by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated before declaring the SR met and returning the instrument channel to service. This condition shall be entered in the plant corrective action program.

3. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, then the SR is not met and the instrument channel shall be immediately declared inoperable.

4. The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the [LTSP or NTSP] at the completion of the surveillance test; otherwise, the channel is inoperable (setpoints may be more conservative than the [LTSP or NTSP] provided that the as-found and as-left tolerances apply to the actual setpoint used to confirm channel performance).

e. The program shall be specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference]~~Changes to the program shall be made in accordance with the requirements of 10 CFR 50.59. Revisions or supplements to the program shall be provided upon issuance to the NRC.~~

NOTE: The BWR/6 3.3.1.1 Bases errata changes are shown in RED. The TSTF-493, Rev. 4 changes are shown in blue.

B 3.3 INSTRUMENTATION

B 3.3.1.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limit, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS), and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters, and equipment performance. Technical Specifications are required by 10 CFR 50.36 to contain LSSS defined by the regulation as "...settings for automatic protective devices...so chosen that automatic protective action will correct the abnormal situation before a Safety Limit (SL) is exceeded." ~~The Analytic Limit is the limit of the process variable at which a safety~~

Technical Specifications are required by 10 CFR 50.36 to~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the ~~Analytic~~Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protective ~~devices~~channels must be chosen to be more conservative than the ~~Analytic~~Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

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

The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where

margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

Licensees are to insert the name of the document(s) controlled under 10 CFR 50.59 that contain the methodology for calculating the as-left and as-found tolerances in Note b of Table 3.3.1.1-1, for the phrase "[insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]" throughout these Bases.

If the [LTSP] is not included in Table 3.3.1.1-1, the plant-specific location for the [LTSP] or NTSP must be cited in Note b of Table 3.3.1.1-1. The brackets indicate plant-specific terms may apply, as reviewed and approved by the NRC~~. The as-found and as-left tolerances will apply to the actual setpoint implemented in the Surveillance procedures to confirm channel performance.~~.

The [LTSP] specified in Table 3.3.1.1-1 is a predetermined setting for a ~~protective device~~protection channel chosen to ensure automatic actuation prior to the process variable reaching the ~~Analytic~~Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the ~~trip setpoint~~ [LTSP] accounts for uncertainties in setting the ~~device~~channel (e.g., calibration), uncertainties in how the ~~device~~channel might actually perform (e.g., repeatability), changes in the point of action of the ~~device~~channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the ~~trip setpoint plays an important role in ensuring~~[LTSP] ensures that SLs are not exceeded. As such, the ~~trip setpoint~~[LTSP] meets the definition of an LSSS (Ref. 1~~) and could be used to meet the requirement that they be contained in the Technical Specifications.~~).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety function(s)." ~~For automatic protective devices,~~Relying solely on the ~~required safety function is to ensure that a SL is not exceeded and therefore the LSSS as defined by 10 CFR 50.36 is the same as the OPERABILITY limit for these devices. However, use of the trip setpoint~~[LTSP] to define OPERABILITY in Technical Specifications~~ and its corresponding designation as the LSSS required by 10 CFR 50.36~~ would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a ~~protective~~

BASES

BACKGROUND (continued)

Two scram pilot valves are located in the hydraulic control unit (HCU) for each control rod drive (CRD). Each scram pilot valve is solenoid operated, with the solenoids normally energized. The scram pilot valves control the air supply to the scram inlet and outlet valves for the associated CRD. When either scram pilot valve solenoid is energized, air pressure holds the scram valves closed and, therefore, both scram pilot valve solenoids must be de-energized to cause a control rod to scram. The scram valves control the supply and discharge paths for the CRD water during a scram. One of the scram pilot valve solenoids for each CRD is controlled by trip system A, and the other solenoid is controlled by trip system B. Any trip of trip system A in conjunction with any trip in trip system B results in de-energizing both solenoids, air bleeding off, scram valves opening, and control rod scram.

The backup scram valves, which energize on a scram signal to depressurize the scram air header, are also controlled by the RPS. Additionally, the RPS System controls the SDV vent and drain valves such that when both trip systems trip, the SDV vent and drain valves close to isolate the SDV.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The actions of the RPS are assumed in the safety analyses of References 3, 4, and 5. The RPS initiates a reactor scram when monitored parameter values are exceeded~~exceed the Allowable Values specified by the setpoint methodology and listed in Table 3.3.1.1-1~~ to preserve the integrity of the fuel cladding, the reactor coolant pressure boundary (RCPB), and the containment by minimizing the energy that must be absorbed following a LOCA.

RPS instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii). Functions not specifically credited in the accident analysis are retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

Notes a and b are applied to the setpoint verification Surveillances for all RPS Instrumentation Functions in Table 3.3.1.1-1 unless one or more of the following exclusions apply:

1. Manual actuation circuits, automatic actuation logic circuits or ~~to~~ instrument functions that derive input from contacts which have no associated sensor or adjustable device, e.g., limit switches, breaker position switches, manual actuation switches, float switches, proximity detectors, etc. are excluded. In addition, those permissives and interlocks that derive input from a sensor or adjustable device that is tested as part of another TS function are excluded.

2. Settings associated with safety relief valves are excluded. The performance of these components is already controlled (i.e., trended with as-left and as-found limits) under the ASME Code for Operation and Maintenance of Nuclear Power Plants testing program.

3. Functions and Surveillance Requirements which test only digital components are normally excluded. There is no expected change in result between SR performances for these components. Where separate as-left and as-found tolerance is established for digital component SRs, the requirements would apply.

As noted at the beginning of the SRs, the SRs for each RPS ~~instrumentation~~instrument Function are located in the SRs column of Table 3.3.1.1-1.

The Surveillances are modified by a Note to indicate that, when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the RPS reliability analysis (Ref. 10) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

SR 3.3.1.1.1

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.7 and SR 3.3.1.1.10

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology. The 92 day Frequency of SR 3.3.1.1.7 is based on the reliability analysis of Reference 10.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.3.1.1.7 for the designated function is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.8

The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.1.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is ~~not beyond~~conservative with respect to the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to ~~be equal to or more conservative than~~the [LTSP] within the as-left tolerance as accounted for in the appropriate setpoint methodology.

The Frequency of 92 days for SR 3.3.1.1.8 is based on the reliability analysis of Reference 10.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.8 for the designated functions is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.9 and SR 3.3.1.1.11

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to the [LTSP] within the as-left tolerance to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

Note 1 states that neutron detectors are excluded from CHANNEL CALIBRATION because they are passive devices, with minimal drift, and because of the difficulty of simulating a meaningful signal. Changes in neutron detector sensitivity are compensated for by performing the 7 day

calorimetric calibration (SR 3.3.1.1.2) and the 1000 MWD/T LPRM calibration against the TIPs (SR 3.3.1.1.6). A second Note is provided that requires the APRM and IRM SRs to be performed within 12 hours of entering MODE 2 from MODE 1. Testing of the MODE 2 APRM and IRM Functions cannot be performed in MODE 1 without utilizing jumpers, lifted leads, or movable links. This Note allows entry into MODE 2 from MODE 1 if the associated Frequency is not met per SR 3.0.2. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

The Frequency of SR 3.3.1.1.9 is based upon the assumption of a 184 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.1.1.11 is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SRs 3.3.1.1.9 and 3.3.1.1.11 for the designated functions are modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

SR 3.3.1.1.12

The Average Power Range Monitor Flow Biased Simulated Thermal Power - High Function uses an electronic filter circuit to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This filter circuit is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. The filter time constant must be verified to ensure that the channel is accurately reflecting the desired parameter.

The Frequency of 18 months is based on engineering judgment and reliability of the components.

SR 3.3.1.1.12 is modified by two Notes as identified in Table 3.3.1.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be within the as-left tolerance of the [LTSP]. Where a setpoint more conservative than the [LTSP] is used in the plant surveillance procedures (NTSP), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the [LTSP], then the channel shall be declared inoperable.

The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].
~~The second Note also requires that [LTSP] and the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].~~

B 3.3 INSTRUMENTATION

B 3.3.2.1 Control Rod Block Instrumentation

BASES

BACKGROUND

Control rods provide the primary means for control of reactivity changes. Control rod block instrumentation includes channel sensors, logic circuitry, switches, and relays that are designed to ensure that specified fuel design limits are not exceeded for postulated transients and accidents. During high power operation, the rod withdrawal limiter (RWL) provides protection for control rod withdrawal error events. During low power operations, control rod blocks from the rod pattern controller (RPC) enforce specific control rod sequences designed to mitigate the consequences of the control rod drop accident (CRDA). During shutdown conditions, control rod blocks from the Reactor Mode Switch - Shutdown Position ensure that all control rods remain inserted to prevent inadvertent criticalities.

The protection and monitoring functions of the control rod block instrumentation have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin

has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [Limiting Trip Setpoint (LTSP)] specified in the SCP, is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the [LTSP] ensures that SLs are not exceeded. Therefore, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Values specified in the SCP serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as found" setting of the protection channel. Therefore, the channel

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.1.5

The LPSP is the point at which the RPCS makes the transition between the function of the RPC and the RWL. This transition point is automatically varied as a function of power. This power level is inferred from the first stage turbine pressure (one channel to each trip system). These power setpoints must be verified periodically to be within the SCP limits. The test for the Rod withdrawal limiter is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation. ~~Allowable Values. If any LPSP is nonconservative, then the affected Functions are considered inoperable.~~ Since this channel has both upper and lower required limits, it is not allowed to be placed in a condition to enable either the RPC or RWL Function. Because main turbine bypass steam flow can affect the LPSP nonconservatively for the RWL, the RWL is considered inoperable with any main turbine bypass valves open. The Frequency of 92 days is based on the setpoint methodology utilized for these channels.

SR 3.3.2.1.6

This SR ensures the high power function of the RWL is not bypassed when power is above the HPSP. The power level is inferred from turbine first stage pressure signals. Periodic testing of the HPSP channels is required to verify the setpoint to be less than or equal to the limit. Adequate margins in accordance with setpoint methodologies are included. If the HPSP is nonconservative, then the RWL is considered inoperable. Alternatively, the HPSP can be placed in the conservative condition (nonbypass). If placed in the nonbypassed condition, the SR is met and the RWL would not be considered inoperable. Because main turbine bypass steam flow can affect the HPSP nonconservatively for the RWL, the RWL is considered inoperable with any main turbine bypass valve open. The Frequency of 92 days is based on the setpoint methodology utilized for these channels.

SR 3.3.2.1.7

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the ~~plant specific setpoint methodology. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology~~SCP. The test for the Rod withdrawal limiter is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

B 3.3 INSTRUMENTATION

B 3.3.4.1 End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation

BASES

BACKGROUND

The EOC-RPT instrumentation initiates a recirculation pump trip (RPT) to reduce the peak reactor pressure and power resulting from turbine trip or generator load rejection transients to provide additional margin to core thermal MCPR Safety Limits (SLs).

The need for the additional negative reactivity in excess of that normally inserted on a scram reflects end of cycle reactivity considerations. Flux shapes at the end of cycle are such that the control rods may not be able to ensure that thermal limits are maintained by inserting sufficient negative reactivity during the first few feet of rod travel upon a scram caused by Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure - Low, or Turbine Stop Valve Closure, Trip Oil Pressure - Low (TSV). The physical phenomenon involved is that the void reactivity feedback due to a pressurization transient can add positive reactivity at a faster rate than the control rods can add negative reactivity.

The protection functions of the EOC-RPT have been designed to ensure safe operation of the reactor during load rejection transients. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the EOC-RPT, as well as LCOs on other system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. . LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-

specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

The [Limiting Trip Setpoint (LTSP)] specified in the SCP is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the [LTSP] accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). Therefore, the [LTSP] ensures that SLs are not exceeded. As such, the [LTSP] meets the definition of an LSSS (Ref. 1).

The Allowable Value specified in the SCP serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. Operable is defined in Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the [LTSP] to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the [LTSP] due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the [LTSP] and thus the automatic protective

B 3.3 INSTRUMENTATION

B 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

BASES

BACKGROUND

The purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure that fuel is adequately cooled in the event of a design basis accident or transient. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ECCS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a Safety Limit (SL) is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

measured output value of the process parameter exceeds the setpoint, the associated device~~channel~~ (e.g., trip unit) changes state. The ~~analytic~~analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the ~~analytic~~analytical limits, corrected for calibration, process, and some of the instrument errors. The ~~trip setpoints~~[LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS (or DG) initiation to mitigate the consequences of a design basis accident or transient. To ensure reliable ECCS and DG function, a combination of Functions is required to provide primary and secondary initiation signals.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Low Pressure Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level - Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated DGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients analyzed in References ~~1~~2 and ~~3.~~4. In addition, the Reactor Vessel Water Level - Low Low Low, Level 1 Function is directly assumed in the analysis of the recirculation line break (Ref. ~~2~~3). The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Reactor Vessel Water Level - Low Low Low, Level 1 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. The Reactor Vessel Water Level - Low Low Low, Level 1 Allowable Value is

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1.4 and SR 3.3.5.1.5

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy.

~~CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodologyThe test is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.~~

The Frequency of SR 3.3.5.1.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. SR 3.3.5.1.4 is performed in accordance with the SCP. For SR 3.3.5.1.4 the SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of SR 3.3.5.1.5 is based upon the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. SR 3.3.5.1.5 is performed in accordance with the SCP. If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the [NTSP] (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

BASES

BACKGROUND

The purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the reactor vessel is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that initiation of the low pressure Emergency Core Cooling Systems (ECCS) pumps does not occur. A more complete discussion of RCIC System operation is provided in the Bases of LCO 3.5.3, "RCIC System." This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RCIC instrumentation, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

---------- REVIEWER'S NOTE ----------
The term "Limiting Trip Setpoint" [LTSP] is generic terminology for the calculated trip setting (setpoint) value calculated by means of the plant-specific setpoint methodology documented in a document controlled under 10 CFR 50.59. The term [LTSP] indicates that no additional margin has been added between the Analytical Limit and the calculated trip setting.

"Nominal Trip Setpoint [NTSP]" is the suggested terminology for the actual setpoint implemented in the plant surveillance procedures where margin has been added to the calculated [LTSP]. The as-found and as-left tolerances will apply to the [NTSP] implemented in the Surveillance procedures to confirm channel performance.

The [LTSP] and NTSP are located in the SCP.

[LTSPs] are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint ~~less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Each Allowable Value specified accounts for~~ , the associated device~~channel~~ (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The [LTSPs] are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties ~~appropriate to the Function. These uncertainties are described in the~~ , process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

The individual Functions are required to be OPERABLE in MODE 1, and in MODES 2 and 3 with reactor steam dome pressure > 150 psig, since this is when RCIC is required to be OPERABLE. (Refer to LCO 3.5.3 for Applicability Bases for the RCIC System.)

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

B 3.3 INSTRUMENTATION

B 3.3.6.5 Relief and Low-Low Set (LLS) Instrumentation

BASES

BACKGROUND

The safety/relief valves (S/RVs) prevent overpressurization of the nuclear steam system. Instrumentation is provided to support two modes of S/RV operation - the relief function (all valves) and the LLS function (selected valves). Refer to LCO 3.4.4, "Safety/Relief Valves (S/RVs)," and LCO 3.6.1.6, "Low-Low Set (LLS) Safety/Relief Valves (S/RVs)," for Applicability Bases for additional information of these modes of S/RV operation. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the Safety/Relief valve instrumentation, as well as LCOs on other reactor system parameters, and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to ~~10 CFR 50.36(c)(1)(ii)(A) requires that Technical Specifications~~ include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that an SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The LSSS values are identified and maintained in the Setpoint Control Program (SCP) controlled by 10.CFR.50.59.

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