

Proposed - For Interim Use and Comment

U.S. NUCLEAR REGULATORY COMMISSION



DESIGN-SPECIFIC REVIEW STANDARD FOR mPOWER™ iPWR DESIGN

16.0 TECHNICAL SPECIFICATIONS

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of technical specifications

Secondary - None

I. AREAS OF REVIEW

Title 10 of the *Code of Federal Regulations* (CFR), Section 50.36 requires that each operating license (OL) issued by the Commission contain technical specifications (TS) that set forth the limits, operating conditions, and other requirements imposed upon facility operation for the protection of public health and safety. As a part of the regulatory standardization effort, the U.S. Nuclear Regulatory Commission (NRC) staff, the Pressurized Water Reactor (PWR) Owners Group, and the Boiling Water Reactor (BWR) Owners Group have prepared standard technical specifications (STS) that are representative of the pressurized and boiling water reactor designs of currently operating licensed reactor facilities. These STS are published by the NRC as five NUREGs; each NUREG is tailored to a particular light-water reactor nuclear steam supply system (NSSS) design and the design of the associated balance-of-plant equipment systems. The STS reflect PWR NSSS designs by Babcock and Wilcox (NUREG-1430), Westinghouse (NUREG-1431), and Combustion Engineering (NUREG-1432) and the BWR4 (NUREG-1433) and BWR6 (NUREG-1434) BWR NSSS designs by General Electric.

The STS NUREGs are subject to change, and the latest versions are available from the NRC [website](http://www.nrc.gov/reactors/operating/licensing/techspecs/current-approved-sts.html) at <http://www.nrc.gov/reactors/operating/licensing/techspecs/current-approved-sts.html>.

STS changes are typically made using a formal change process. The nuclear electrical power generation industry participates in this process through the Technical Specifications Task Force (TSTF), a joint activity of the PWR and BWR Owners Groups. The TSTF coordinates with the NRC to implement the change process (also referred to as the TSTF traveler process), which is designed to ensure incorporation of a change into the STS only after the NRC staff and the TSTF agree to the change. However, the NRC staff can change the STS without industry concurrence when warranted.

Each STS NUREG is maintained current and updated by the TSTF traveler process as described on the NRC website to reflect the following:

- Modifications to TS-required NSSS-related SSCs or balance-of-plant equipment systems.
- Revisions to regulatory requirements.

- Experience obtained by the NRC staff in reviewing proposed TS changes from licensees.
- Operational experience obtained from licensees and reviewers responsible for assessment of events at operating plants, development of generic communications, and the operating plant oversight process (inspection program).

10 CFR 52.47(a)(11) and 52.79(a)(30) provide that a design certification (DC) applicant and a combined license (COL) applicant, respectively, shall propose TS prepared in accordance with 10 CFR 50.36 and 50.36a. Accordingly, a DC applicant for an iPWR proposes generic TS (GTS) in Chapter 16 of the Design Control Document (DCD) as part of the DC application. And a COL applicant proposes plant-specific TS, which consist of the GTS and site-specific TS, as part of the COL application that references an iPWR DC rule. A COL applicant may also propose plant-specific TS as part of a COL application that does not reference a DC rule.

1. Design Certification Application Review Areas

The GTS are derived from and must be consistent with the proposed iPWR NSSS design and the associated safety and probabilistic risk analyses. The DC applicant evaluates the proposed iPWR design and the associated analyses against the four criteria of 10 CFR 50.36(c)(2)(ii) to ensure that the proposed GTS contain limiting conditions for operation (LCOs) for all structures, systems, and components (SSCs) and parameters that satisfy one or more of the criteria. The DC applicant should present the results of this evaluation in DCD Chapter 16 as part of the DC application.

The specific areas of an iPWR DC application review are as follows:

- A. The proposed GTS are reviewed for whether the breadth, scope, detail, format and content are consistent with that of the STS, which are based on currently operating PWR designs, and the approved GTS in the DCD for certified PWR designs.

The Writer's Guide for Plant-Specific Improved Technical Specifications, TSTF-GG-05-01, June 2005 (ML070660229), was followed in preparing the latest revision to the STS NUREGs and should be used to achieve and maintain consistency among the TS requirements for different reactor designs.

The TS requirements for an SSC depend on the properties and functions of the SSC. For example, the repair completion time for a system component or a system train may depend on the significance of the system's expected role or function during postulated accident or transient scenarios. Insight for defining TS requirements for a proposed iPWR design can be obtained from TS requirements defined for NSSS designs previously reviewed and approved by the NRC. Such insight can result from considering the properties, functions, and significance of SSCs in the proposed iPWR design and comparing them to the properties, functions, and significance of similar or functionally equivalent SSCs in previously approved NSSS designs. Insight for defining TS requirements can also be obtained from the STS for the operating reactors and the GTS for approved certified PWR NSSS designs, and by considering similarities and differences among the SSCs and TS requirements of these designs. STS NUREGs are being developed for approved certified NSSS designs that have been referenced by

COL applicants. When available these NUREGs can provide insight for defining iPWR TS requirements as well.

Parameters and SSCs with unique considerations, such as an unusual design or application, may need TS requirements that depart from STS or GTS requirements previously approved by the NRC for similar or functionally equivalent SSCs or parameters in other NSSS designs. Careful attention should be paid to defining TS requirements for such SSCs and parameters.

- B. The proposed GTS are reviewed for whether they are consistent with 10 CFR 50.36(c)(2) and (c)(3), by specifying the following for each applicable SSC and parameter:
- i. An LCO with appropriate conditions of applicability within which it must be met;
 - ii. Remedial actions that must be performed when an LCO is not met and that are appropriate to the safety significance of the specified plant condition; and
 - iii. Surveillance requirements to verify the capability of the SSC to perform its specified safety function, or that the parameter is within specified limits, that have test intervals consistent with both the reliability and availability assumed in the NSSS design's probabilistic risk assessment (PRA). The choice of a SR frequency should also take into consideration past precedents, and the operating and test history for similar TS-required SSCs, and recommendations of the SSC's manufacturer.
- C. The proposed GTS are reviewed for whether the approach for defining each proposed GTS requirement for an SSC is different from traditional approaches such as those used in STS for a similar or functionally equivalent SSC in other designs. The DC applicant is expected to have provided clear justifications and bases for such approaches in the DCD.

For a DC application that uses risk-informed decision making for defining TS requirements, the review will verify that the application addresses information needs identified in NUREG-0800 "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition - Section 16.1 Risk-informed Decision Making: Technical Specifications," Rev. 1, March 2007. (Reference 15)."

- D. The proposed GTS are reviewed for whether only site-specific information is bracketed. In general, site-specific information, numerical values and graphs necessary for plant operation may not be complete at the DC application stage. Such preliminary or placeholder site-specific information in the proposed GTS is enclosed in brackets. Such bracketed information is designated as "COL information" which must be finalized by each applicant for a COL referencing the DC rule. The review of information provided in this area is limited to whether the values reasonably agree with the expected operational capability of the plant, as stated in the DCD. Accordingly, the DC application review is conducted with partial information and the level of review is commensurate with the information provided in the DCD.

For a DC application, the review will address the appropriateness of COL information (also referred to as COL items or COL action items) and DC requirements and

restrictions (e.g., interface requirements and site parameters). A DC applicant is expected to provide guidance for completing a COL item, when necessary conditions for completing the item are not obvious or self-evident. The guidance can take the form of a "Reviewer's Note" (for use by COL applicant reviewers and NRC technical reviewers) either in the proposed GTS or GTS bases, or in the introductory Tier 2 information in DCD Chapter 16.

- E. If a proposed iPWR design includes passive safety systems, the proposed GTS are reviewed for whether TS LCOs or short-term availability controls for active nonsafety systems are specified based on the results of the regulatory treatment of nonsafety systems (RTNSS) evaluation in DCD Section 19.3.
- F. The bases for proposed GTS Sections 2 and 3 are reviewed for whether the level of detail, format and content are consistent with that of the STS bases, which are based on currently operating PWR designs, and the approved GTS bases in the DCD for certified PWR designs. The bases are reviewed for consistency with the associated proposed TS requirements and related portions of the iPWR DCD.

2. Combined License Application Review Areas

COL applicants who reference a DC rule should propose plant-specific TS consisting of the GTS, which are the TS approved as a part of the design approval and certification, and site-specific TS; i.e., bracketed COL information. A COL applicant incorporates the GTS into the COL application by reference and may propose departures from the GTS prior to issuance of the COL by requesting an exemption from the associated DC rule appendix to 10 CFR Part 52 in accordance with 10 CFR 52.7.

The GTS serve as interim STS for the certified NSSS design pending development of an associated STS NUREG. Although GTS are not included in the STS NUREG change process, a COL applicant who references a DC rule should develop plant-specific TS using the GTS as a starting point. A holder of a COL may propose changes to the plant-specific TS in accordance with 10 CFR 52.98 and 10 CFR 50.90 in order to adopt approved changes to the STS NUREGs when such changes apply. Therefore, such amendment requests are anticipated to occur for each plant licensed under 10 CFR Part 52.

COL applicants who do not reference a DC rule should propose plant-specific TS based on applicable parts of the current STS NUREGs and certified GTS, and the design of the proposed NSSS, including the design's safety analyses and the unit's probabilistic risk analysis (PRA). Areas of review for a DC application (except for Item I1.d above), therefore, also apply to the review of a COL application that is not based on a DC rule. For such a COL application, the applicant should present in the COL application the results of its review of the plant design and safety analysis against the LCO criteria of 10 CFR 50.36(c)(2)(ii).

An applicant for a COL under 10 CFR Part 52 should propose plant-specific TS in Section 16 of the FSAR, which contains the plant-specific design control document (DCD), as a part of the COL application. The proposed plant-specific TS should be based on the current STS NUREGs and any approved but not yet incorporated STS changes, or the GTS if referencing a certified plant design.

To support issuance of a COL under 10 CFR 52.97, the staff must approve the final version of TS, which were originally proposed in the FSAR or the generic DCD and subsequently completed as part of the COL application. The approved plant-specific TS reflect the final refinements in design, test results, and expected method of operation, and are issued with the COL. Compliance with the TS is a condition of the license.

The specific review areas for a COL application, whether or not it references an iPWR design certification rule, are the following:

- A. The proposed plant-specific TS are compared to the applicable reference TS (the current STS, the GTS, or both) to determine whether content and format are consistent with that of the reference TS.
- B. The proposed plant-specific TS are reviewed for whether the application states adequate technical justification for each departure from the reference TS. Special attention is given to TS provisions that depart from the reference TS to determine whether proposed differences are justified by uniqueness in plant design or other considerations so that 10 CFR 50.36 is met.

COL applicants wishing to adopt STS changes into the proposed plant-specific TS are responsible for fully describing and justifying in the COL application the consequent departures from the GTS for the referenced certified design because DCD GTS are not included in the TSTF traveler process.

For a COL application that uses risk-informed decision making for defining TS requirements, the review will verify that the application addresses information needs identified in Standard Review Plan Section 16.1, "Risk-Informed Decision Making: Technical Specifications." (Reference 15)

- C. The proposed plant-specific TS are reviewed for whether the site-specific TS, which replace or confirm the COL information enclosed in brackets in the GTS, are in conformance with the FSAR and are useable for unit operation.

At the DC application stage, determination of site-specific TS numerical values is pending future decisions by the COL applicant on selection and procurement of hardware after issuance of the DC rule.

The COL application review will verify that the plant-specific TS are complete. For COL applications referencing a certified plant design the review will verify that the COL applicant has provided site-specific information to resolve COL items included in Chapter 16 of the referenced generic DCD. Regardless of whether the COL application references a certified plant design, the plant-specific TS issued with the COL must be complete and cannot contain COL items or unresolved site-specific information. Additionally, for a COL application referencing a certified plant design, the COL applicant must address requirements and restrictions (e.g., interface requirements and site parameters) included in the referenced DC.

COL applicants referencing a certified plant design shall propose plant-specific TS containing all site-specific information that is necessary to ensure plant operation within its design basis. The COL applicant shall confirm all preliminary information and provide all missing information that is denoted in the GTS by bracketed values, reviewer's notes, or any other placeholder. The plant-specific TS issued with the COL

will be complete and will contain no COL items for the COL holder to resolve (i.e., completing the plant-specific TS). The COL will contain no license condition on completing the plant-specific TS.

COL applicants shall resolve all GTS COL items before COL issuance. The COL applicant may propose to resolve each such item using one of the following three options, listed in order of preference:

- i. Provide a plant-specific value or plant-specific information.
- ii. Provide a value or information that bounds the plant-specific value or information, but by which the plant may be safely operated (i.e., a useable bounding value or useable bounding information).
- iii. Establish a plant-specific TS Section 5.5 or 5.6 administrative controls program or report.

An administrative controls TS as described in option (iii) shall require (a) use of an NRC-reviewed and -approved methodology for determining the plant-specific value, (b) establishment of an associated document, outside the plant-specific TS, in which the relocated plant-specific value shall be recorded and maintained, and (c) any other information or restrictions the NRC staff deems necessary and appropriate to satisfy 10 CFR 50.36. For example, some COL applicants have proposed an administrative controls technical specification for a setpoint control program to satisfy 10 CFR 50.36(c)(1)(ii)(A) in lieu of specifying explicit values for the limiting safety system settings in the plant-specific TS.

Options (ii) and (iii) should allow an applicant to provide the necessary information without relying on information that is impractical to obtain before the time of COL issuance (i.e., information such as design detail, equipment selection, as-built system configuration, and system test results).

- D. The bases for proposed plant-specific TS Sections 2 and 3 are reviewed for whether the level of detail, format and content are consistent with those of the STS bases, which are based on currently operating PWR designs, the approved GTS bases in the DCD for certified PWR designs, and if referencing an iPWR DC rule, the GTS bases. The bases are reviewed for consistency with the associated proposed plant-specific TS requirements and related portions of the FSAR, and whether all site-specific bracketed information is complete.

3. Review Interfaces

Other Design Specific Review Standard (DSRS) sections interface with this section as follows:

- A. The TS branch reviewer, with concurrence from applicable technical branch reviewers, determines the acceptability of GTS and bases proposed in an iPWR DC application, or plant-specific TS and bases proposed in a COL application. The TS branch reviewer and licensing PM coordinate supporting reviews by technical branch reviewers, utilizing the current work planning process as follows:
 - i. The technical branch reviewers determine, the validity of site-specific

features, methods, and numerical values proposed by applicant.

- ii. The TS branch reviewer, in coordination with the reviewer of nonsafety systems requiring regulatory treatments (RTNSS SSCs), which is addressed by Standard Review Plan (SRP) Section 19.3 (Reference 16), shall determine which RTNSS SSCs should be included in TS and which of these SSCs should be included in short term availability controls. In determining the SSCs which PRA has shown to be significant to public health and safety, the TS branch reviewer shall coordinate with technical branch reviewers responsible for DCD or FSAR Chapters 15 and 19 with specific attention to the risk significance of SSCs identified in accident analyses and PRA.
 - iii. The licensing PM integrates the TS review effort into the appropriate design certification process or COL licensing process and advises the TS branch reviewer of any TS-related matters found to be deficient during the design certification process or COL licensing process.
 - iv. The technical branch reviewers report the results of their evaluations as indicated in Subsection III of this DSRS section.
- B. Usually, TS reviews are done on a TS section basis by TS branch reviewers and technical reviewers from responsible technical branches. Technical branches have TS sections within their areas of technical review responsibility as listed in the following table. (Note that in coordinating this review, the licensing PM should use this table as guidance for preparing technical review assignments using the organizational structure in place at the time of the review.)

TS Section	Technical Areas
1.0 Use and Application	TS, instrumentation and control, core physics, pressure and temperature limits, accident analysis, PRA
2.0 Safety Limits (SLs)	TS, pressure and temperature limits, accident analysis, PRA, core physics
3.0 LCO Applicability	TS, PRA
3.0 SR Applicability	TS, PRA
3.1 Reactivity Control Systems	TS, core physics, reactor core design, accident analysis, PRA
3.2 Power Distribution Limits	TS, core physics, reactor core design, accident analysis, PRA
3.3 Instrumentation	TS, instrumentation and control (analog and digital), accident analysis, PRA

TS Section	Technical Areas
3.4 Reactor Coolant System (RCS)	TS, RCS design, mechanical, materials, chemical, RCS over–pressure protection, accident analysis, PRA
3.5 Emergency Core Cooling Systems (ECCS)	TS, mechanical, accident analysis, PRA
3.6 Containment Systems	TS, mechanical, chemical, accident analysis, PRA
3.7 Plant Systems	TS, mechanical, accident analysis, PRA, ventilation air filtration, heating and air conditioning, and hydrology ultimate heat sink (UHS)
3.8 Electrical Power Systems	TS, electrical, mechanical, chemical
3.9 Refueling Operations	TS, accident analysis, PRA, instrumentation, reactivity controls
4.0 Design Features	TS, fuel design, fuel storage
5.0 Administrative Controls	All technical areas including but not limited to TS, reactor core design, mechanical, electrical, quality assurance, radiological controls, core physics, accident analysis, instrumentation and control, ventilation filter testing, chemical, structural, health physics, accident radiological consequence analysis, PRA, human factors, pressure and temperature limits

C. SRP Section 16.1 (Reference 15) provides guidance for reviewing the application of risk–informed decision making to TS. No DSRS corresponding to this SRP section was deemed necessary.

Specific acceptance criteria and review procedures are contained in the DSRS sections pertaining to technical review areas listed above.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations that require applications to include proposed TS:

- 10 CFR 50.34(b)(6)(vi)
- 10 CFR 50.36
- 10 CFR 50.36a
- 10 CFR 52.47(a)(11)
- 10 CFR 52.79(a)(30)

DSRS Acceptance Criteria

Specific DSRS acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are set forth below. The DSRS is not a substitute for the NRC's regulations, and compliance with it is not required. Identifying the differences between this DSRS section and the design features, analytical techniques, and procedural measures proposed for the facility, and discussing how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria, is sufficient to meet the requirements in 10 CFR 52.47(a)(9). The same approach may be used to meet the requirements of 10 CFR 52.79(a)(41) for COL applications.

The STS developed for each of the operating light-water-reactor NSSSs and the associated balance-of-plant systems can provide guidance on many aspects related to TS requirements and the associated bases. The latest STS versions are available from the NRC [website](http://www.nrc.gov/reactors/operating/licensing/techspecs/current-approved-sts-html) at <http://www.nrc.gov/reactors/operating/licensing/techspecs/current-approved-sts-html>.

The PWR STS and GTS that may provide guidance for preparing TS requirements for iPWR designs are:

- NUREG-1430, STS, Babcock and Wilcox Plants, Rev. 4
- NUREG-1431, STS, Westinghouse Plants, Rev. 4
- Westinghouse AP1000 design certification rule, Appendix D to 10 CFR Part 52, and DCD Tier 2, Revision 19, Section 16.1, GTS and bases (ML11171A382)

For COL applicants referencing a certified design, the GTS and bases of the referenced design provide the guidelines for the evaluation of proposed plant-specific TS.

In addition, an iPWR DC applicant may consider changes to plant-specific TS, which were obtained by way of license amendment by a COL holder, as supplemental guidance to the associated referenced AP1000 GTS.

An iPWR DC applicant may also consider approved, but not yet incorporated, TSTF travelers as supplemental guidance to the STS.

Technical Rationale

The technical rationale for application of these acceptance criteria to the areas of review addressed by this DSRS section is discussed in the following paragraphs:

1. 10 CFR 52.47(a)(11) requires DC applications to include TS prepared in accordance with 10 CFR 50.36 and 10 CFR 50.36a.

10 CFR 52.79(b) requires COL applications to include TS prepared in accordance with 10 CFR 50.36 and 10 CFR 50.36a.
2. 10 CFR 50.36 requires that TS include the following:
 - A. Safety Limits (SLs). SLs apply to important process variables necessary for an appropriate level of protection for the integrity of certain physical barriers that guard against the uncontrolled release of radioactive material. See 10 CFR 50.36, subsection

50.36(c)(1)(i), paragraph (A).

- B. Limiting Safety System Settings (LSSSs). LSSSs are for automatic protective devices affecting variables with significant safety functions. See 10 CFR 50.36, subsection 50.36(c)(1)(ii), paragraph (A).
- C. Limiting Conditions for Operation (LCOs). LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee must shut down the reactor or follow any remedial action permitted by the TS until the condition can be met. See 10 CFR 50.36, subsection 50.36(c)(2)(i).

An LCO must be established in the TS for a nuclear reactor for each item meeting one or more of the following criteria; see 10 CFR 50.36, subsection 50.36(c)(2)(ii), paragraphs (A), (B), (C), and (D):

Criterion 1. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Criterion 2. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 3. An SSC that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 4. An SSC which operating experience or PRA has shown to be significant to public health and safety.

- D. Surveillance Requirements (SRs). SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met. See 10 CFR 50.36, subsection 50.36(c)(3).
- E. Design Features. Design features affect aspects of the facility (e.g., construction materials and geometric arrangements) not covered in the categories described above that, if altered or modified, would have significant effects on safety. See 10 CFR 50.36, subsection 50.36(c)(4).
- F. Administrative Controls. Administrative controls are provisions for organization and management, procedures, record-keeping, review and audit, and reporting necessary to assure safe operation of the facility. See 10 CFR 50.36, subsection 50.36(c)(5).

The requirements of 10 CFR 50.36 provide assurance that essential safety-related items and issues of facility design and operation (i.e., those derived from analyses and evaluations included in the safety analysis report) are identified.

3. 10 CFR 50.36a requires each licensee of a nuclear power reactor to include TS that require (A) operating procedures for the control of effluents and (B) annual reports of the quantity of principal radionuclides released to unrestricted areas in both gaseous and liquid effluents. The STS contain model TS for radiological effluents in Section 5.5, "Programs and Manuals," and Section 5.6, "Reporting Requirements."
4. The scope and criteria for selecting nonsafety-related-SSC functions for regulatory treatment use the following five criteria to determine those SSC functions (RG 1.206, C.IV.9.2):
 - A. SSC functions relied on to meet deterministic NRC performance requirements such as those set forth in 10 CFR 50.62 for mitigating an anticipated transient without scram (ATWS) event, and 10 CFR 50.63 for mitigating a station blackout (SBO) event, also known as a loss of all onsite and offsite ac electrical power sources.
 - B. SSC functions relied on to ensure long-term safety (beyond 72 hours) and to address seismic events.
 - C. SSC functions relied on during power-operating and shutdown conditions to meet the Commission's safety goal guidelines of a core damage frequency (CDF) of less than $1\text{E-}4$ each reactor year and a large release frequency (LRF) of less than $1\text{E-}6$ each reactor year.
 - D. SSC functions needed to meet the containment performance goal, including containment bypass, during severe accidents.
 - E. SSC functions relied on to prevent significant adverse system interactions.

Based on SECY-94-084 Policy and Technical Issues Associated with Regulatory Treatment of Non-Safety Systems in Passive Plant Designs, March 28, 1994. (ML003708068)(Reference 11) and SECY-95-132 Policy and Technical Issues Associated with Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084), May 22, 1995. (ML003708005)(Reference 12), the identified SSCs and their containing structures should have defined functional R/A missions and appropriate short-term availability control provisions if TS requirements are not defined for them. Many of the nonsafety-related-SSC functions identified by these five criteria, particularly those identified by criteria c and d, will be those identified as meeting Criterion 4 of 10 CFR 50.36, paragraph 50.36(c)(2)(ii)(D), as discussed in item II.2.c above. These SSCs shall be included in the TS as the subject of an LCO in accordance with 10 CFR 50.36. SRP section 19.3 (Reference 16) provides extensive guidance regarding the RTNSS evaluation of nonsafety-related SSCs and criteria for whether such SSCs meet Criterion 4 of 10 CFR 50.36, paragraph 50.36(c)(2)(ii)(D).

III. REVIEW PROCEDURES

The reviewer will select material from the procedures described below, as may be appropriate for a particular case.

These review procedures are based on the identified DSRS acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the

proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II.

1. The TS branch reviewer with the assistance of technical branch reviewers, as appropriate, reviews the DC applicant's evaluation of the iPWR design against the criteria of 10 CFR 50.36(c)(2)(ii) to confirm that LCOs are established in the GTS for all SSCs and parameters that satisfy one or more of the four criteria outlined in that regulation. The review includes verifying that the "Applicable Safety Analyses" section of the bases for each GTS Section 3.1 through 3.9 specification subsection correctly states which of the four criteria the associated specified SSC or parameter satisfies.
2. Review of TS and bases at the DC or COL application stage for 10 CFR Part 52 applications is done item by item for applicability, format, and specific content by comparing the proposed TS provision with an equivalent provision, if available, in the STS or GTS for previously approved PWR designs (i.e., the reference TS).

- A. For a DC application review, each of the items is reviewed against related information in the DCD, including the safety analyses and the PRA, and by using available applicable guidance in the reference TS. The bases corresponding to each proposed TS Section 2 or 3 provision should provide clear and technically accurate reasoning for the selection of the provision.

If a reference TS provision is used to justify a proposed TS provision, all differences between the reference TS and the proposed TS provisions, including differences between the respective bases, are reviewed for their acceptability by comparing the affected SSC in the proposed iPWR plant design and the affected SSC in the plant design associated with the reference TS.

- B. For the review of a COL application, the reviewer verifies that the site-specific numerical values, graphs, tables, and other data proposed in the plant-specific TS are complete and consistent with the FSAR. The reviewer also verifies that the level of detail in the proposed plant-specific TS are consistent with level of detail in the referenced DC GTS, or the reference TS if the COL application is not based on a DC rule. This information is reviewed for compliance with material presented in applicable FSAR sections as summarized in the supporting bases for each TS Section 2 or 3 specification subsection. The plant-specific TS bases in the COL application should also refer to FSAR sections that support and provide clarifying details for each TS Section 2 or 3 specification subsection.
- C. A COL application that references a DC rule must justify each departure from the referenced DC GTS or bases. Any such departure requires an NRC-approved exemption from the referenced DC rule in order for the departure to be included in the plant-specific TS that are issued with a COL. The reviewer ascertains whether the applicant has adequately justified each proposed departure from the DC rule GTS and bases, and whether the applicant has shown that each such departure satisfies the 10 CFR 52.7 conditions for granting an exemption.
- D. The proposed generic or plant-specific TS bases should justify the specified variables, conditions, or other limitations as those required by 10 CFR 50.36 to be LCO subjects. Reviewers should give special attention to the review of proposed TS provisions that may be influenced by the plant design to minimize subsequent facility modifications or license

changes to harmonize the as-built plant design and the final plant-specific TS issued with a COL.

- E. The TS branch reviewer consults with specialists in the technical review organizations as necessary to determine the acceptability of proposed site-specific values and information provided by the COL applicant to complete the plant-specific TS.
- 3. All TS provisions and TS bases are expected to receive a minimum level of review by the TS branch reviewer. As a minimum, the TS branch reviewer will ascertain whether the SSC's or parameter's:
 - A. TS adequately address all of the elements for TS that are required by 10 CFR 50.36 and 10 CFR 50.36a;
 - B. TS and TS bases are consistent with the structure and content of the standard TS and standard TS bases (References 3 and 4);
 - C. TS and TS bases are consistent with the iPWR design and safety analyses;
 - D. TS omit no necessary provisions. An example of an omission of a necessary provision would be an LCO requirement not supported by a corresponding surveillance requirement;
 - E. TS contain no logical conflicts. An example of a logical conflict would be a case in which a supported system's LCO applicability was broader than a necessary support system's LCO applicability; and
 - F. TS do not conflict with TS Sections 1.2, "Logical Connectors," 1.3, "Completion Time," and 1.4, "Frequency," and TSTF-GG-05-01 (Reference 9).
- 4. When a deficiency identified is in one provision of a specification it may be present in provisions of other specifications. The reviewer will determine whether the deficiency might be systemic to the remainder of the proposed TS. If the reviewer makes such a determination, a request for additional information is sent to the applicant that asks the applicant to find and resolve all instances of the deficiency.
- 5. At the completion of the review, a proof-and-review copy of the generic or plant-specific TS is prepared for review by the contributing technical branches, as appropriate. This review verifies completion of all TS or bases changes committed to by the applicant in order to resolve technical, formatting, and editorial issues raised by the staff. Each technical branch ascertains the acceptability of TS sections within the branch's area of responsibility and advises the TS branch and the licensing PM of its findings. Following correction of any deficiencies, the TS are ready for issuance as a part of a DC or COL.
- 6. Additional Review Considerations. Experience reviewing TS changes, developing and revising STS, and developing TS for DCs suggest attention to the following items: (note that this list is not exhaustive.)
 - A. When reviewing a difference between the proposed TS provision and the reference TS provision, the reviewer verifies that the applicant's written technical or administrative reasoning in support of the difference is logical, complete, and clearly written.
 - i. Administrative differences such as a preference in terminology should be

globally consistent in the TS. Editorial differences are usually acceptable in the TS bases provided the intent of the reference TS bases is maintained; however, editorial differences in the phrasing of TS LCO, applicability, action, and surveillance requirements are discouraged. Such differences should be given careful consideration to ensure the alternative phrasing is equivalent to the reference TS phrasing and maintains consistency with the format and usage rules embodied in the STS. STS format is important, in some cases conveys meaning, and reflects the incorporation of human factor insights into the STS.

- ii. Technical differences must have sound technical justifications. If a justification for a difference refers to a topical report, the reviewer verifies that all applicable conditions for reliance on it are met. Conditions for referencing a topical report are typically stated in the reference TS or bases as "Reviewers Note," the topical report itself, or the NRC's safety evaluation of the topical report. Topical or technical reports not previously reviewed, should be formally reviewed and approved by the NRC before being used in support of any aspect of the plant's design or TS requirements. In some cases, an applicant may need to justify applying a topical report, which is approved for other designs, to the proposed plant design.

- B. The bases for STS provide a wealth of information on the purposes and roles of SLs, LCOs, and applicability, action and surveillance requirements. Particularly important are the descriptions of the roles that LCO-specified SSCs or parameters play in the plant's safety analyses of postulated accidents and transients. Also important are statements regarding the 10 CFR 50.36(c)(2)(ii) criteria that LCO-specified SSCs or parameters satisfy.

The bases for proposed GTS and proposed plant-specific TS are derived in part from the bases for the reference TS (STS, GTS, or both). Therefore, regardless of any technical differences between the proposed TS bases and the reference TS bases, the reviewer should determine whether the GTS bases or plant-specific TS bases are consistent with the accident analyses and system descriptions in the respective generic DCD or plant-specific FSAR. In addition, the proposed TS bases should describe the basis for each TS requirement accurately. A deficiency in the bases for a reference TS provision does not justify repeating or maintaining the deficiency in the bases for the corresponding provision in the proposed TS.

- C. A working understanding of TS application and usage rules and formatting conventions, specified in STS Section 1.2, "Logical Connectors," STS Section 1.3, "Completion Time," and STS Section 1.4, "Frequency," and the general LCO and SR specifications specified in STS Section 3.0 is necessary for reviewing TS proposed in DC or COL applications or in license amendment requests by a COL holder to revise plant-specific TS.
 - D. Whenever the technical justification for a proposed difference from the reference TS appeals to probabilistic risk analysis insights, consult SRP Section 16.1 (Reference 15) for review acceptance criteria and procedures.
7. Many features of an iPWR design may be significantly different from functionally equivalent design features of previously approved, certified, and licensed PWR designs. Consequently, there may be only marginally applicable reference STS or GTS available

to support preparation of GTS to be included in DCD Chapter 16 of an iPWR DC application. Therefore, the reviewer should assure that the proposed TS are consistent with the following general principles of TS, which are embodied in the STS. Many of these principles were previously described in standard ANSI/ANS-58.4-1979 (Reference 10), which was withdrawn in 1989, and to which the reviewer may refer for more detail.. A brief discussion of the main items from this standard (augmented to use terminology for describing requirements in the improved STS NUREGs) follows:

A. Safety Limits

Specifications for safety limits (SLs) apply to process variables which are continually observable and measurable, for example, pressures, temperatures, flow rate, power, neutron flux. SLs shall be prescribed for selected process variables related to the integrity of the barriers to fission product release. Safety limits shall be selected such that compliance with them provides assurance that the barrier will perform as assumed in the safety analyses.

B. Limiting Safety System Settings

Limiting safety system settings (LSSS) are chosen such that no SL will be violated as a result of a frequent plant process condition, and that no infrequent or limiting plant process condition would have consequences which do not meet the acceptance criteria for that condition. LSSS allow for instrument drift, minor operational errors and fluctuations in process or control characteristics. The difference between the SL and the LSSS should be sufficient to allow for corrective action by the safety (protection) system to return to normal operation or to shut the reactor down before the SL will be reached for the most severe abnormal situation anticipated during the life of the plant.

The LSSS correspond to the nominal trip setpoints (NTSs). The NTS is the instrument trip or actuation setting established during channel calibration. The NTS provides the required margin to the trip or actuation setting assumed in the accident analyses, which is typically called the analytical limit. The margin to the analytical limit provided by the NTS ensures that over the channel calibration interval a reactor trip and safety system actuation will occur before the monitored parameter exceeds the analytical limit, thereby preventing a violation of the associated SL.

C. Limiting Conditions for Operation

Consistent with 10 CFR 50.36(c)(2)(ii), limiting conditions for operation (LCOs) are provided for the following when they are relied upon in the safety analyses ; LCOs for these items are included in TS for most licensed reactors:

- i. Condition, or status, of equipment or systems (for example, the minimum number of safety injection subsystems required to be operable);
- ii. Parameter limits with no associated instrument alarms or protective action setpoint (for example, the maximum iodine activity allowed in the reactor coolant system);
- iii. Instrument setpoints for monitored parameters with no associated automatic protection action (for example, the limits on control rod position during power

- operation); and
- iv. Instrument setpoints for monitored parameters with associated automatic protective actions (for example, the settings for instruments which actuate safety injection subsystems or initiate a reactor trip).

10 CFR 50.36(c)(2) requires that TS include LCOs that establish the lowest acceptable level of performance (i.e., functional capability) for a system or a component, or the minimum number of components or portion of the system that must remain operable for the plant to be within the safety envelope defined by the safety analyses during all modes of operation.

To properly define an LCO for a parameter, one needs to consider both the minimum complement of equipment necessary to maintain all modes of plant operation in the “normal” range, and what is necessary to accommodate abnormal situations.

When an LCO is not met, the associated specification shall include remedial actions that are required to be taken if the operable status of the equipment or system is less than the required minimum; the monitored parameters are not within the specified range; or the instrument setpoints are less conservative than the specified limiting as-found value.

For each specified condition of failure to meet the associated LCO, the associated required actions typically specify resolving the condition such that the LCO is met before expiration of the specified completion time for the restoration action. In the event the restoration action is not accomplished within the specified completion time, the associated required actions typically require—within a specified time period—placing the unit in a mode of operation in which meeting the LCO is not required. For some specified conditions, the associated required actions may permit operation to continue indefinitely without restoring compliance with the LCO based on establishing, within the specified restoration completion time, a specified plant configuration which is deemed to provide a level of safety protection that is equivalent to the safety protection provided by meeting the LCO.

D. Surveillance Requirements

Surveillance requirements (SRs) delineate testing, calibration, monitoring, and inspection in sufficient scope, depth, and frequency to provide assurance that equipment, systems and process variables are within the LCOs. Each LCO shall be supported by SRs.

SRs and associated LCOs are complementary. For a specific system, an LCO establishes the minimum performance level, and the SRs will prescribe the frequency and scope of tests to demonstrate such performance.

The frequency and type of surveillances should be based, as much as possible, on quantitative data derived through experience or experiment. Experience with similar equipment used in operation of nuclear power plants should be used, as applicable.

E. Design Features

Design features of the facility which, if altered or modified, could have significant effects on safety and which are not covered by the SLs, LCOs, or SRs, are incorporated in TS Section 4.0.

F. Administrative Controls

Administrative controls are included in the technical specifications to assure that operation of the facility is conducted in a safe manner. Included are requirements for site organization, responsibility, unit staffing qualifications, procedures, and reports that support LCOs by providing numerical values for limits on cycle-specific core operating parameters and reactor coolant system pressure and temperature limits. Also included are programmatic requirements for supporting SRs, inservice testing, steam generator tube inspection, meeting 10 CFR 50.36a, and control of changes to TS bases.

G. Technical Specifications Bases

Bases for TSs summarize the reasons for each TS requirement and are provided for SLs, LSSS, LCOs and associated requirements regarding modes or conditions of applicability, actions, and surveillances.

The bases explicitly correlate the plant design and safety analyses with the technical specification limits and operating conditions, thereby providing a validation of the overall design for the prescribed modes of operation.

Specific aspects to be addressed in the bases for different types of technical specifications are as follows:

- i. Bases for Safety Limits (SLs): The bases shall identify the barrier to fission product release that is being protected by the limit and show why that limit is adequate.
- ii. Bases for Limiting Safety System Settings (LSSS): The bases shall identify the safety limit or other safety requirement that is being ensured by the LSSS and shall describe all allowances included in determining the relationship of the LSSS to the safety limit or other safety requirement. The bases shall discuss the conditions under which the bypass of automatic protection associated with an LSSS is performed. The bases for LSSS are presented with the bases for LCOs on instrumentation functions.
- iii. Bases for Limiting Conditions for Operation (LCOs): The bases shall identify the safety analysis assumption or other safety requirement that established the need for the LCO, and shall discuss why the specified lowest functional capability, performance level of equipment, limiting value of a process parameter, or conservative actuation limit for specified automatic protection devices is appropriate. The rationale for deviations from the specified conditions as allowed by the remedial action statements shall also be discussed.
- iv. Bases for Surveillance Requirements (SRs): Where it is not obvious that the surveillance supports the LCO, the bases shall describe how the specified surveillance will assure compliance with the LCO. The rationale for the

surveillance frequency shall be identified to facilitate consistent modifications to the frequencies where warranted by plant performance and operating history.

- H. TS defined (or lack of) for the non-safety systems should be a review focus. As per 10 CFR 50.36(c)(2), Criterion 4, a TS LCO must be established for an SSC which operating experience or PRA has shown to be significant to public health and safety. Accordingly, TS should be defined for risk-significant nonsafety-related SSCs and the use of TS may be the preferred regulatory treatment for assuring the availability of these SSCs. TS review of these SSCs should, however, take into consideration other regulatory treatment for these SSCs (e.g., Maintenance Rule, Reliability Assurance Program). The Maintenance Rule and the Reliability Assurance Program do not necessarily obviate the need for a TS. Appropriate regulatory oversight (R/A missions, short-term availability control mechanisms, design information for reliability assurance program and Maintenance Rule implementation) are defined for nonsafety systems satisfying the RTNSS criteria. The review of the adequacy of the regulatory oversight when an SSC is not included in the TS is not the focus here.

For a DC application for an NSSS design that relies on passive safety systems, the DC applicant must propose SSCs to be included in the RTNSS evaluation. The RTNSS SSCs are identified using the criteria provided in Section C.IV.9.2 of RG 1.206. The determination of whether a RTNSS SSC is required to be covered by an investment protection short term availability control (availability control) or by a TS LCO, is left to the DC applicant to propose and the NRC staff to assess.

A nonsafety-related SSC must be included in a TS LCO if it satisfies any of the four criteria of 10 CFR 50.36(c)(2)(ii). Insights from probabilistic risk assessment or operating experience may lead the applicant and the staff to a determination that some RTNSS SSCs should be included in TS LCOs because, in particular, they satisfy 10 CFR 50.36(c)(2)(ii)(D) Criterion 4. An availability control would not be provided for such a RTNSS SSC, since establishing a TS LCO provides the needed regulatory oversight for the SSC and reasonable assurance that the SSC will meet its mission if challenged.

Chapter 22 of the NRC final safety evaluation report (FSER) for the ESBWR design approval (DCD Chapter 19, Revision 9), and Section 16.3 of the NRC FSER for the AP1000 DC (DCD Section 16.3, Revision 19) established precedents for criteria to use in identifying a RTNSS SSC that satisfies Criterion 4 in certified passive NSSS designs. SSCs meeting these precedents should have operability requirements specified by an LCO in the GTS. These precedents are reflected in the guidance for the review of RTNSS SSCs provided by DSRS Section 19.3, "Regulatory Treatment of Non-Safety Systems (Passive Advanced Light Water Reactors)."

Each RTNSS SSC that does not warrant operability requirements specified by a TS LCO, is normally the subject of an availability control. The availability control for a RTNSS SSC specifies the plant operational conditions during which the RTNSS SSC must be available, similar to how the applicability of a TS LCO specifies when a required system must be operable. However, the staff's review of availability controls for RTNSS SSCs is not the focus here.

For review of an iPWR DC application, the reviewer should follow the above guidance to verify that the design, including requirements and restrictions (e.g., interface requirements and site

parameters), set forth in the generic DCD meets the acceptance criteria. The reviewer should also consider the appropriateness of identified COL items.

IV. EVALUATION FINDINGS

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report (SER). The reviewer also states the bases for those conclusions.

Any items which require special attention at this stage of our review have not been identified.

DC Application Review and COL Application Review Not Referencing a DC Rule. The staff concludes that the proposed TS satisfy 10 CFR 50.34, 10 CFR 50.36, and 10 CFR 50.36a requirements. The conclusion is based on the finding that the proposed TS include all aspects addressed in the previous section. The specific requirements identified for each aspect have been fully addressed.

COL Application Review Referencing a DC Rule. The staff concludes that the proposed TS satisfy 10 CFR 50.34, 10 CFR 50.36, and 10 CFR 50.36a requirements. This conclusion is based upon the finding that the proposed TS comply with the DCD GTS for the [certified design acronym] as in the DCD and 10 CFR Part 52, Appendix [C], with appropriate modifications for plant-specific and other technical considerations. The staff also concludes that the plant-specific TS are complete and contain no COL items.

For DC application GTS reviews and COL application plant-specific TS reviews, the findings will also summarize the staff's evaluation of requirements and restrictions (e.g., interface requirements and site parameters) relevant to this DSRs section.

V. IMPLEMENTATION

The staff will use this DSRS section in performing safety evaluations of mPower™-specific design certification (DC), or combined license (COL), applications submitted by applicants pursuant to 10 CFR Part 52. The staff will use the method described herein to evaluate conformance with Commission regulations.

Because of the numerous design differences between the mPower™ and large light-water nuclear reactor power plants, and in accordance with the direction given by the Commission in SRM- COMGBJ-10-0004/COMGEA-10-0001, "Use of Risk Insights to Enhance the Safety Focus of Small Modular Reactor Reviews," dated August 31, 2010 (ML102510405), to develop risk-informed licensing review plans for each of the small modular reactor (SMR) reviews including the associated pre-application activities, the staff has developed the content of this DSRS section as an alternative method for mPower™-specific DC, or COL applications submitted pursuant to 10 CFR Part 52 to comply with 10 CFR 52.47(a)(9), "Contents of applications; technical information."

This regulation states, in part, that the application must contain "an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application." The content of this DSRS section has been accepted as an alternative method for complying with 10 CFR 52.47(a)(9) as long as the mPower™ DCD FSAR does not deviate significantly from the design assumptions made by the NRC staff while preparing this DSRS section. The application must identify and describe all differences between the standard plant design and this DSRS section, and discuss how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria. If the design assumptions in the DC application deviate significantly from the DSRS, the staff will use the SRP as specified in 10 CFR 52.47(a)(9). Alternatively, the staff may supplement the DSRS section by adding appropriate criteria in order to address new design assumptions. The same approach may be used to meet the requirements of 10 CFR 52.79(a)(41), for COL applications.

VI. REFERENCES

1. 10 CFR 50.34, "Contents of Applications."
2. 10 CFR 50.36, "Technical Specifications."
3. 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."
4. NUREG-1430, "Standard Technical Specifications, Babcock and Wilcox Plants."
5. NUREG-1431, "Standard Technical Specifications, Westinghouse Plants."
6. NRC Inspection Manual Chapter IMC-2504, "Construction Inspection Program - Non-ITAAC Inspections," issued April 25, 2006.
7. Letter, Thomas E. Murley to Walter S. Wilgus, dated May 9, 1988, "NRC Staff Review of Nuclear Steam Supply Vendors Owners Groups' Application of The Commission's Interim Policy Statement Criteria to Standard Technical Specifications."

8. SECY-08-0142, dated September 25, 2008, "Change in Staff Position Concerning Information in Plant-Specific Technical Specifications that Combined License Applicants Must Provide to Support Issuance of Combined Licenses. "
9. TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specifications," June 2005.
10. ANSI/ANS -58.4-1979, American National Standard Criteria for Technical Specifications for Nuclear Power Stations, issued January 25, 1979.
11. SECY-94-084, Policy and Technical Issues Associated with Regulatory Treatment of Non-Safety Systems in Passive Plant Designs, March 28, 1994 (withdrawn 1989).
12. SECY-95-132, Policy and Technical Issues Associated with Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084), May 22, 1995.
13. RG 1.206, Section C. IV.9, Regulatory Treatment of Nonsafety Systems, June 2007.
14. NUREG-0800, Section 16.0, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition — Technical Specifications," Rev. 3, March 2010.
15. NUREG-0800, Section 16.1, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition — Risk-informed Decision Making: Technical Specifications," Rev. 1, March 2007.
16. NUREG-0800, Section 19.3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition — Severe Accidents — Regulatory Treatment of Non-Safety Systems for Passive Advanced Light Water Reactors," Draft Rev. 0, October 2012.