TECHNICAL REPORT

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Operability Determination

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While it was not requested to have this document endorsed by the NRC, it is important to note that numerous interactions with NRC staff occurred in the development of this guidance in conjunction with the NRC updating inspector guidance contained in IMC-0326, Operability Determination. Any subsequent updates of this guidance should strongly consider if additional NRC interaction is warranted.

NEI Project Lead: Tim Riti

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Executive Summary

In 1991, the U.S Nuclear Regulatory Commission issued Generic Letter (GL) 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability." The inspector guidance promulgated by this GL has been revised on several occasions and is currently provided in NRC Inspection Manual Chapter 0326, "Operability Determinations." Since issuance of GL 91-18, nuclear power plant operators have incorporated aspects of the inspector guidance into their station processes; however, industry operating and regulatory experience has indicated the need to provide additional guidance to plant management and operating staff. This document describes an approach that may be used by the nuclear utility industry to develop plant-specific programs and procedures for evaluating the operability of structures, systems and components (SSC) addressed in technical specifications (TS) when deficient conditions are identified. This document focuses on the operability determination process.

The guidance in this document does not establish or relieve any regulatory requirements but suggests a process to ensure appropriate steps are taken to ensure plant safety and TS compliance are maintained when deficient SSC conditions are identified.

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1 INTRODUCTION

This document provides guidance for assessing operability. Operability is a continuous process, and the assessment of operability is the responsibility of a licensed senior reactor operator (SRO) on the operating shift crew.

The terms "operable" or "operability" do not appear in laws or regulations related to commercial nuclear power. The terms are defined in the technical specifications (TS) for each plant and, therefore, only have meaning as used relative to that document. Further, no regulatory requirements exist regarding entry into the documented operability process, how to assess operability, or how to transition between the states of operability and inoperability.

This document will utilize the improved Standard Technical Specifications (STS) NUREG[1] definition of "Operable/Operability"[2] which states:

> “A system, subsystem, train, component, or device shall be OPERABLE when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified function(s) [3] are also capable of performing their related support function(s).”

This definition of operability has not changed since Revision 0 of the improved STS that was issued in 1992.

The regulatory obligation regarding operability is compliance with the requirements specified in TS. Therefore, the management of operability is a fundamental priority for nuclear plant operators. Practical application necessitates a structured and consistent approach to operability determination. This guidance is provided to assist in the determination of the operability of TS structures, systems, and components (SSC).

The immediate, primary, and ongoing concern is the safe operation of the plant. When an SSC deficiency that may pose a threat to public health and safety is identified, the plant should be placed or maintained in a safe condition whether or not action is explicitly required by regulations. In cases where the SSC is specifically addressed by the plant’s TS limiting conditions for operation (LCOs), there should be a reasonable expectation that the SSC is operable while operability is being assessed, or the appropriate TS requirements should be followed.

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[1] NUREG-1430, NUREG-1431, NUREG-1432, NUREG-1433, NUREG-1434, and NUREG-2194.

[2] The TS of all operating plants have either the definition of operability provided in Generic Letter 80-30, or the STS definition of operability. As the majority of operating plant TS are based on the improved STS, the improved STS definition will be used in this document.

[3] The term "specified function(s)" in the GL 80-30 definition is equivalent to the improved STS term "specified safety function(s)".

2 SCOPE AND APPLICABILITY

The Corrective Action Program (CAP) is designed to satisfy the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." CAP is used to identify, track, and resolve conditions adverse to quality (CAQ), including significant conditions adverse to quality (SCAQ). Deficient conditions are evaluated under the CAP. If those evaluated deficient conditions meet the operability entry criteria, operability should be assessed as described in section 4, "Operability Determination Process" of this document.

2.1 Scope of SSC for Operability Determinations

The scope of SSC considered within the operability determination process is limited to those SSC that are required to be operable by TS and those SSC which provide necessary support functions for SSC required to be operable. For example, the capabilities of a cooling system not directly addressed by the TS may perform a necessary support function for an SSC directly required by a TS LCO.

Operational impacts of deficient conditions of other SSC not subject to TS LCOs should be considered and evaluated under existing processes (i.e. CAP), but are not subject to the operability process.

3 DEFINITIONS

The following definitions are provided for terms that are used in this document.

3.1 Compensatory Actions

As used in this document, a compensatory action is any action taken in response to an identified deficient condition to restore or maintain the operability of an SSC until the deficient condition can be corrected.

3.2 Deficient SSC Condition

A deficient SSC condition is one which may compromise the required capabilities of the affected SSC. A subset of deficient SSC conditions will require an assessment of operability as described in Section 4, “Operability Determination Process.”

3.3 Design Bases

As defined in 10 CFR 50.2[4], design bases means that information which identifies the specific functions to be performed by a SSC of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a SSC must meet its functional goals.

The design basis for safety-related SSC is initially established during the original plant licensing and relates primarily to accident and event prevention or mitigation functions. Design bases information is documented in the final safety analysis report (FSAR) and is updated as required by 10 CFR 50.71(e).

3.4 Licensing Basis

The licensing basis is the set of NRC requirements applicable to a specific plant, plus a licensee's docketed and currently effective written commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis, including all modifications and additions to such commitments over the life of the facility operating license.

The set of NRC requirements applicable to a specific plant licensing basis includes:

- NRC regulations in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73, and 100 and appendices thereto;
- Commission orders;
- License conditions;
- Exemptions;

[4] NRC Regulatory Guide 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases," endorses Appendix B to Nuclear Energy Institute (NEI) document NEI 97-04, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases."

- Technical specifications;
- Plant-specific design basis information defined in 10 CFR 50.2 and documented in the most recent UFSAR (as required by 10 CFR 50.71);
- Licensee commitments remaining in effect that were made in docketed licensing correspondence (such as licensee responses to NRC bulletins, Licensee Event Reports, generic letters, and enforcement actions); and
- Licensee commitments documented in NRC safety evaluations.

3.5 Mission Time

As used in this document, the mission time is the time an SSC must be capable of performing the specified safety function.

3.6 Necessary Support Function

A necessary support function is a function required for the supported TS system, subsystem, train, component, or device to perform its specified safety function. This means that the support function is necessary and requires the support SSC to achieve the specified safety function.

3.7 Operable – Operability

The STS define "Operable – Operability" as follows:

> “A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s), and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).”

Plant-specific TS that are not based on the STS definition typically define "Operable – Operability" as follows:

> “A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).”

As described above, a plant-specific definition may differ from that found in the STS. Any difference in the definition does not imply a significant difference in application of the plant-specific TS.

3.8 Presumption of Operability

A TS SSC is presumed to be operable if the associated surveillance requirements (SR) have been met, unless there is a deficient condition associated with the SSC or its required and necessary support SSC that meets the three required entry criteria described in Section 4.1, "Three Required Entry Criteria."

The improved STS Bases for SR 3.0.1 state:

> "Systems and components are assumed to be OPERABLE when the associated SRs have been met. Nothing in this Specification, however, is to be construed as implying that systems or components are OPERABLE when:
>
> a. The systems or components are known to be inoperable, although still meeting the SRs; or
>
> b. The requirements of the Surveillance(s) are known to be not met between required Surveillance performances."

3.9 Reasonable Expectation of Operability

Upon discovery of a deficient condition which satisfies the three required entry criteria described in Section 4.1, the *presumption of operability* is lost. A subsequent determination of operability should be based on the "reasonable expectation," from the evidence collected, that the SSC are capable of performing its specified safety function and that the operability determination will support that expectation. Reasonable expectation does not mean absolute assurance that the SSC are operable. The SSC may be considered operable when there is evidence that the possibility of failure of an SSC has increased, but not to the point of eroding confidence in the reasonable expectation that the SSC remains operable. The supporting basis for the reasonable expectation of SSC operability should provide a high degree of confidence that the SSC remain operable. It should be noted that the standard of "reasonable expectation" is a high standard, and that there is no such thing as an indeterminate state of operability; an SSC is either operable or inoperable.

The concepts of *presumption of operability* and *reasonable expectation of operability* are distinct and do not coexist.

3.10 Specified Safety Function/Specified Function

A Specified Safety Function (SSF) is a function of controlling importance to safety assumed to be performed by a system, structure, or component (SSC) in the analyses and evaluations summarized in the Updated Final Safety Analysis Report (UFSAR), typically Chapters 6 and 15 or the plant-specific equivalent chapters. These specified safety functions are needed to obviate the risk of an immediate threat to the public health and safety. SSFs are the subset of all SSC functions that meet one or more criterion in 10 CFR 50.36(c)(2)(ii), as described in the NRC's Final Policy Statement on Technical Specifications Improvement, unless otherwise stated in the docketed plant-specific SSF scope. Consequently, the SSFs may not be all of the SSC functions described in the UFSAR. The plant specific SSF scope derives from the functions and design conditions for performance relied on by the licensee and the NRC when the Technical Specifications (TS) were prepared, submitted, reviewed, and approved. For plants with Standard

Technical Specifications, these functions are typically discussed in the TS Limiting Condition for Operation (LCO) Bases.

Additional information regarding the derivation of this definition is provided in Appendix B, “Definition of Specified Safety Function” of this guidance.

4 OPERABILITY DETERMINATION PROCESS

The control room operating staff should be aware of the operability status of SSC. Conclusions regarding TS compliance in regard to SSC operability are ultimately the responsibility of an on-shift licensed Senior Reactor Operator.

Appendix A, “Specific Operability Consideration” of this guidance contains information regarding specific conditions for consideration when performing an operability determination.

4.1 Three Required Entry Criteria

The assessment of operability is a continuous process. Issues and questions should be addressed through other appropriate station processes until such time that a deficient condition is confirmed. Entry into the documented operability determination process is contingent upon the deficient condition satisfying the three required entry criteria.

If an SSC is clearly inoperable (incapable of performing its specified safety function) as a result of a deficiency (for example, loss of motive power or failed TS surveillance), it is inoperable and the requirements of TS must be satisfied. A documented operability determination is not necessary.

If a deficient condition satisfies the three required entry criteria, a documented operability determination is required. If the three required entry criteria are not satisfied, then the presumption of operability remains and a documented operability determination is not required. However, an on-shift licensed Senior Reactor Operator always has the option to have a documented operability determination performed.

Regardless of whether a documented operability determination is performed, deficient conditions are still subject to the corrective action process. Operability is a continuous process, and provisions should exist for reexamining deficient conditions against the three required entry criteria if new functional impacts or other aspects (e.g. degrading trends) affect the previous assessment.

The three required entry criteria are based upon the TS definition of operability, which requires the performance of "functions." In order to challenge operability, the deficient conditions <u>must satisfy all of the following three required entry criteria</u>:

Criterion 1: The deficient condition <u>must</u> affect a TS SSC installed in an operating unit.

Criterion 2: The deficient condition <u>must</u> have a functional impact on the SSC. This includes the ability to perform required functions under postulated, off-normal design conditions.

Criterion 3: The functional impact of the deficient condition <u>must</u> be substantive (i.e., non-trivial).

As used within Criteria 2 and 3, the functional impact refers to the function most closely related to the deficient condition.

Expanding upon Criterion 2, for a functional impact to exist there must be direct evidence of the condition, or there is an observable or confirmed impact.

Expanding upon Criterion 3**,** the functional impact of the deficient condition is substantive based on a simplistic evaluation. Examples of substantive (more than trivial) may include:

- The deviation from as-designed values is more than approximately 10%
- Closed system leakage greater than 1% of operating volume per day

If the deficient condition is not amenable to a simplistic evaluation, then the functional impact is substantive and criterion 3 is satisfied.

Criterion 3 acknowledges that SSC are designed, licensed, and installed with substantial margins. This concept is discussed in Regulatory Guide 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases."

If Criterion 3 is not satisfied (i.e., the effect of the deficient condition is not substantive) any postulated margin loss is either non-existent or trivial. It also includes consideration of design errors that may result in functional issues during off-normal events. In every instance, the deficient condition would have the following characteristics:

- The deficient condition is manifested at a functional level beneath that described in the UFSAR.
- No evidence or indication that a functional impact would be manifest under off-normal/accident conditions.
- If the available margin is amenable to an estimate, then the margin loss may be characterized as non-existent or trivial. Examples may include;
    - Design margin loss is estimated to be approximately 10% or less (using the as-designed value as a reference)
    - Closed system leakage that is stable, less than 1% of operating volume per day, and with no other impacts.

4.2 Documented Operability Process

Documentation of an operability determination may be informal for the simplest cases, such as captured by a checked box, documented in plant operating logs, or in corrective action forms. In other cases, a formally documented evaluation in accordance with plant-specific procedures may be required. In either case, an operability determination should consider all available information and will involve data gathering, consideration of plant and SSC conditions, and appropriate use of engineering judgment.

Operability determinations should be documented in sufficient detail to allow an individual knowledgeable in the technical discipline associated with the condition to understand the basis for the determination. For the simplest cases requiring no additional justification, operability can be simply and adequately documented in existing plant process documents – for example, indication by a check-box on a corrective action form. For straightforward determinations of operability, only the assumptions supporting the conclusion of the operability determination need be documented. Plant records such as operator logs or corrective action program documents are often sufficient documentation.

In some cases, a formally documented engineering analysis involving calculations and evaluations or other additional information may be necessary to support an operability determination. Such analyses should be reviewed and approved as required by plant procedures, with supporting information included or appropriately referenced tying back to the initial operability determination that was made.

It is worth noting that when IMC-0326 was revised on 10/1/2019 the terms “immediate” and “prompt” determinations of operability were removed since there was no regulatory basis. Many licensees adopted these concepts into their site-specific procedures and may choose to keep those terms since they do not conflict with the revised inspection manual chapter or methods described in this document when making initial operability determinations that requires follow up support information to be included.

Operability determinations may include the following information:

- The SSC affected by the deficient condition, and the nature and severity of the deficiency.
- Technical specification LCOs and Surveillance Requirements that include specific operability requirements for the SSC being evaluated.
- The SSC specified safety functions related to the deficient condition, including the licensing basis source for the information.
- The potential effects of the deficient condition on the SSC's ability to perform specified safety functions for its specified mission time.
- If follow up information is needed in support of the initial operability determination, the initial operability determination should document the basis of a reasonable expectation of operability while the follow up information is being prepared.

Additionally, when warranted, the following additional information should also be considered for inclusion into a documented operability determination.

- Identification of any operational or environmental conditions or limits necessary to maintain the validity of the operability determination.
- Identification of any compensatory actions implemented to compensate for the deficient condition and maintain SSC operability, and the administrative processes under which such actions are implemented and maintained.

Documentation of operability determinations may be subject to subsequent reviews by plant management, oversight staff, and NRC inspection personnel. Engineering judgement that may be used or limited information that may be available when developing an Operability Determination should support independent review.

Record development and retention requirements for operability determinations should be established in the site’s administrative processes.

4.2.1 Determination of Operability

After confirming the three required entry criteria are met, a determination of SSC operability should be completed. The determination should be made without delay and in a controlled manner using the best available information. While this determination may be based on limited information, the information should be sufficient to conclude that there is a reasonable expectation that the SSC is operable. The determination of operability should not be postponed until receiving the results of detailed evaluations. If a piece of information material to the determination is missing or unconfirmed, and cannot reasonably be expected to support a determination that the SSC is operable, the SSC should be considered inoperable. While the determination is in progress, operators should remain aware of the status of affected SSC. The determination that is initially made should document the basis for concluding that a reasonable expectation of operability exists.

A determination of operability may yield only one of three possible conclusions:

- The SSC is operable and additional information is not expected to change the conclusion. The determination of operability is concluded.
- The SSC is inoperable, and the determination of operability is concluded.
- The SSC maintains a reasonable expectation of operability while more information is obtained to confirm the initial determination.

Follow up information may be needed to confirm or refute the conclusion of the initial determination of SSC operability. This is warranted when additional information, such as supporting analysis, is needed to confirm the initial operability determination made by the licensed SRO. Operations support, engineering, and licensing personnel can appropriately assist development of the additional information needed to support initial operability determinations to be presented to an on shift licensed SRO for acceptance. On shift licensed SROs should be kept aware of the status of ongoing evaluations.

Regulatory requirements establish no explicit time limit for completing follow up information supporting the initial determination of operability; however, when needed, this information to confirm earlier conclusions should be done without unnecessary delay. A reasonable expectation of operability must exist throughout the time period the follow up information is being gathered, otherwise the SSC should be declared inoperable.

Timeliness of follow up information supporting the initial determination of operability may be affected by the complexity or safety significance of the issue. For example, it may be appropriate to complete this information in support of the initial operability determination within a few hours for situations involving highly safety significant SSC. Follow up information can often be done within hours of discovery even if complete information is not available. If more time is needed to gather additional information (such as a vendor analyses or calculations), plant staff can evaluate the risk importance of the additional information to decide whether to accept the extended schedule. TS completion time for the inoperability of the affected SSC is one factor that can be used in determining an appropriate time frame within which follow up information in support of the initial operability determination should be completed.

4.3 Other Considerations

4.3.1 Sufficiency of Operability Determination

The scope and content of a documented operability determination should be sufficient to support the conclusion that the SSC can perform its specified safety function(s). The operability determination may be based on analysis, testing, historical operating performance, operating experience, vendor-supplied information, engineering judgment, or any combination thereof.

TS operability is focused on the capability of the SSC to perform its specified safety function. Accordingly, clearly identifying the specified safety functions is critical to an effective determination of operability. As described in the definition of specified safety function, a review of the plant licensing basis is sometimes necessary to provide a clear understanding of the specified safety function.

The following factors should be considered when performing documented operability determinations:

- The licensing basis is plant-specific; the UFSAR, TS bases, and safety evaluations should be reviewed to confirm the applicability of generic licensing considerations related to operability;

- Th applicable Modes or other specified conditions in the Applicability of the relevant TS;

- The operability requirements include the capability of all necessary and required support systems to perform their related support functions;

- The occurrence of multiple simultaneous design basis events should be assumed only to the extent that they are described in the plant's licensing basis;

- The capability of the SSC to perform its specified safety function in its current state. Consideration should be given to the sustained operability as plant or environmental conditions change, or as a deficient condition may progress over time; and

- Sustained operability may be dependent on compensatory actions such as temporary cooling or ventilation, modified instrumentation or control settings, temporary procedure changes, and increased surveillance activity. Increased monitoring may be required to monitor conditions that could degrade over time to ensure the assumptions in the Operability Determination is maintained until such time the deficient condition is resolved. Feasibility and effectiveness of such actions should be verified to support any conclusion of operability. Appendix A.3, "Compensatory Actions" provides additional considerations on the use of Compensatory Actions. 10 CFR 50.59 applies to interim compensatory actions to determine whether the temporary change or compensatory action impacts other aspects of the facility or procedures in such a way that prior NRC approval is required. See NEI 96-07, Revision 1, "Guidelines for 10 CFR 50.59 Implementation."

A graded approach should be used when determining the amount of information necessary to support the documented conclusion that an SSC is operable. One of the key concepts associated with the operability determination process is that the process should conclude when additional information will not alter the determination.

4.3.2 Continuous Monitoring of Operability

A continuous understanding of the operability status should be maintained for an SSC in a deficient condition until the deficiency is resolved. Initial conclusions regarding operability can be affected by factors such as plant operating conditions, power levels, support system performance, and environmental conditions. If, at any time, information is discovered that invalidates a previous operability determination, operability should be reassessed.

5 OPERATIONAL DECISIONS BASED ON OPERABILITY DETERMINATIONS

The purpose of an operability determination is to provide a basis for making a timely decision on TS compliance when a deficient SSC condition is discovered.

Correction of deficient conditions is not part of the operability process. Corrective actions are discussed in Appendix C, "Additional Considerations for Corrective Actions of Deficient Conditions."

5.1 Operability Determination Conclusions

The following conclusions are possible as a result of operability determination.

5.1.1 SSC Inoperable

An SSC is inoperable when it is unable to perform its specified safety functions due to a deficient condition in the SSC itself or in an SSC that is necessary to provide a required support function. This could be immediately apparent upon discovery of the condition, (i.e., a self-revealing event such as a failed surveillance requirement), or could be determined through an operability determination.

5.1.2 SSC Operable

When a deficient condition is identified, operability should be assessed. The operability determination may conclude that the deficient condition does not prevent the performance of the specified safety functions. For example, an assessment for a deficient condition in a non-TS ventilation system may conclude that a TS support function is impaired. The supported TS SSC, however, could remain operable due to the current plant conditions or alternate systems that can provide the necessary support function. Because operability of the affected SSC is not compromised, the LCO continues to be met.

An SSC addressed in TS can sometimes be operable even though a deficient condition is present. The effect of the deficiency might include a reduction in the margin between expected SSC performance and the ability to perform the specified safety function. For example, heat exchanger fouling might reduce the cooling capabilities of a decay heat removal system to a level below expected performance requirements, but the system SSC may still be fully capable of the heat removal necessary to perform the specified safety function.

6 REFERENCES

1. NRC Inspection Manual Chapter 0326, "Operability Determinations”

2. Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Chapters on Resolution of Degraded and Nonconforming Conditions and on Operability."

3. 10 CFR 50.2, "Definitions."

4. NUREGs 1430 - 1434, NUREG-2194 "Standard Technical Specifications."

5. 10 CFR 50.36, "Technical specifications."

6. NEI 96-07, Revision 1, "Guidelines for10 CFR 50.59 Implementation."

APPENDIX A: SPECIFIC OPERABILITY CONSIDERATIONS

A.1 Consequential Failures in Operability Determinations

A consequential failure is a failure of an SSC caused by an accident for which the subject SSC provides a mitigating function, as postulated in the licensing basis. For example, a loss-of-coolant accident (LOCA) may cause pipe whip or jet impingement that incapacitates an emergency core cooling pump needed to mitigate the effects of a LOCA. Such a failure is a consequential failure because the pump fails as a result of the event itself. In general, the facility design provides adequate protection against consequential failures.

When an SSC is found to be deficient, the operability determination should assess credible consequential failures that may result from any postulated event for which the deficient SSC needs to function. When, due to a deficient SSC condition, a postulated event would cause a consequential failure resulting in the loss of the capability to perform a specified safety function, the affected SSC is inoperable.

A.2 Use of Alternative Analytical Methods to Determine Operability

When performing operability determinations, analytical methods or computer codes different from those originally used in the calculations supporting the plant design may be used. This practice involves applying engineering judgment to determine if an SSC remains capable of performing its specified safety function during the corrective action period. The use of alternative methods is not subject to 10 CFR 50.59 unless the methods are used in the final corrective action. The use of alternative methods should generally consider the following:

a. Occasionally, a regulation or license condition may specify the name of the analytical method for an application. In such instances, the application of the alternative analysis must be consistent with the TS, license condition, or regulation. For example, the methods used to determine limits placed in the core operating limits report (COLR) may be specified in TS. An evaluation of an SSC performance capability may be determined with a non-COLR method, but the limits in the COLR must continue to comply with the technical specification.

b. The use of any alternative analytical method must be technically appropriate to characterize the SSC involved, the nature of the deficient condition, and specific facility design. General considerations for establishing this adequacy include:

    1. If the analytic method in question is described in the licensing basis, the situation-specific application of this method should be evaluated, including the differences between the licensing basis method and the proposed application in support of the operability determination process.

    2. Utilizing a new method because it has been approved for use at a similar facility does not alone constitute adequate justification.

    3. The method should produce results consistent with the applicable acceptance criteria in the licensing basis. For example, if the current performance levels are expressed in

terms of Rem, the method should not generate results expressed in TEDE (total effective dose equivalent).

4. If the analytic method is not currently described in the licensing basis, the models employed must be capable of properly characterizing the SSC's performance. This includes modeling of the effect of the deficient condition.

5. Acceptable alternative methods, such as the use of "best estimate" codes, methods, and techniques, is acceptable. In these cases, the evaluation should ensure that the SSC's performance is not over-predicted by performing a benchmark comparison of the alternative analysis methods to the applicable licensing basis analysis methods.

6. The use of the software should be controlled in accordance with the quality assurance program, as applicable. This includes the availability of reviewers qualified to verify results.

A.3 Compensatory Actions

When proposing compensatory action to maintain or restore operability, many aspects should be considered such as feasibility, resource availability, post-accident environment, staging of necessary tools and equipment, and the need for personnel training. In determining whether a compensatory action is acceptable, the effect of the action on other aspects of the facility should also be considered. Quality assurance program requirements for temporary design modification and procedural controls should be satisfied and the requirements of 10 CFR 50.59 are applicable if the compensatory measure involves a change to the facility or procedures as described in the UFSAR. See NEI 96-07, "Guidelines for 10 CFR 50.59 Implementation."

While a compensatory action may be implemented to maintain or restore SSC operability and ensure plant safety, it is not an exception to TS compliance. For example, if automatic actuation of a component has failed, it is possible that manual actuation of the component following an accident would satisfy the assumptions in the safety analysis. However, if a TS SR requires verification of automatic actuation, the associated limiting LCO is not met.

For situations where substitution of manual action for automatic action is proposed as a compensatory action, the evaluation of manual action should focus on the physical differences between automatic and manual action and the ability of the manual action to accomplish the specified safety functions. The physical differences include the ability to recognize input signals for action, ready access to or recognition of setpoints, design nuances that may complicate subsequent manual operation (such as auto-reset, repositioning on temperature or pressure), timing required for automatic action, minimum staffing requirements, and emergency operating procedures written for the automatic mode of operation. Written procedures should be in place and personnel should be trained on the procedures before manual action is substituted for the loss of an automatic action. The consideration of a manual action in remote areas should include the time needed to reach the area and occupational hazards such as radiation, temperature, chemical, sound, or visibility hazards.

Increased monitoring may be used to monitor conditions that could degrade over time to ensure the assumptions in the Operability Determination is maintained. Increased monitoring may also be used as good operational/watchstanding practices but not credited to maintain operability. The operability determination should clearly document when increased monitoring is credited to maintain operability.

A.4 Consideration of Probability and Risk in Operability Determinations

The definition of operability (that the SSC must be capable of performing its specified safety functions) is based on the inherent assumption that the event occurs. Therefore, the use of probability of occurrence of accidents or external events is not acceptable for making operability decisions. In other words, the likelihood that an SSC will not be needed is not an appropriate consideration when determining if it is capable of functioning as intended.

Probabilistic risk assessment involves the consideration of both the probability of occurrence and the consequences of an event, and can be a valuable tool for determining the safety significance of SSC. The safety significance, whether determined by PRA or other analyses, may be considered when making decisions about the timeliness and technical rigor of operability determinations.

A.5 Piping and Pipe Support Requirements

A deficient condition may involve piping or pipe supports. Inspection and Enforcement (IE) Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems," including Supplements 1 and 2, provides additional guidance. The following references also provide information that may be helpful in performing evaluations.

- SQUG GIP-2 provides acceptance criteria that can be used to confirm operability of mechanical component anchorages consistent with design basis loadings.

- Regulatory Guide 1.199, "Anchoring Components and Structural Supports in Concrete", November 2003 endorses American Concrete Institute (ACI) 349, 2001, "Code Requirements for Nuclear Safety Related Concrete Structures," and provides acceptance criteria for evaluation of deficient nonconforming or degraded anchors (steel embedments).

A.6 Structural Requirements

Structures may be required to be operable by the TS, or they may be providing related support functions for systems or components addressed by TS operability requirements. When a structure deficiency is identified, affected TS SSC should be evaluated for operability.

For structures and related support functions, operability determinations should demonstrate that a reasonable expectation of operability exists for meeting acceptance limits for expected load combinations. The use of loads, load combinations, and load factors should be consistent with design and licensing basis assumptions unless adequately justified.

Physical degradation such as concrete cracking and spalling, excessive deflection or deformation of structures, water leakage, corrosion of rebar, cracked welds, corrosion of steel members, corrosion of anchor bolts, bent anchor bolt(s), or structural bolting of a structure or component may be evaluated in accordance with generally accepted industry standards and guidance documents.

Current industry standards, technical reports, or regulatory guidance may be used in operability determinations in addition to or in lieu of the standards specified in the licensing basis, provided the necessary technical requirements and conditions are met to justify such use for the specific application.

Operability determinations may rely on as-built material properties when the properties of the materials are established based on test data and a sound statistical basis, for example:

- Structural steel yield and tensile strength from Certified Material Test Reports may be used in lieu of the specified minimum yield and tensile strength.

- Concrete compressive strength from cylinder tests may be used in lieu of the specified minimum design strength.

Operability determinations may apply current regulatory guidance to reduce design basis conservatism, if applicable. For example:

- Damping values from Regulatory Guide 1.61, "Damping Values for Seismic Design of Nuclear Power Plants."

- Tornado and tornado missile characteristics from Regulatory Guide 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants."

A.7 Technical Specification Operability vs. ASME OM Code Criteria

Operability is distinct from compliance with the American Society of Mechanical Engineers (ASME) Operation and Maintenance of Nuclear Power Plants (OM) Code and related regulatory requirements unless IST requirements have been incorporated into TS. In those instances when IST testing is being used to satisfy a surveillance requirement, the normal rules of TS usage would apply.

The ASME OM Code establishes the requirements for preservice and inservice testing and the examination of certain components to assess their operational readiness. ASME OM Code acceptance criteria for inservice testing (IST) include "required action ranges" or limiting values for certain component performance parameters. These required action ranges or limiting values, defined by the ASME OM Code as component performance parameters, may be more limiting than the TS values (which are accident analysis limits). When performance data fall outside the required action range, the deficient condition should be reviewed in accordance with Section 4, “Operability Determination Process.”

A.8 Operability during Technical Specification Surveillances

If performance of TS surveillances requires that SSC be rendered incapable of performing their specified safety function, the SSC are inoperable.

If during a test it is obvious that a test instrument is malfunctioning, the test may be halted and the instruments recalibrated or replaced. During a test, anomalous data with no clear indication of the cause should be attributed to the pump or valve under test.

Test failures should be examined to determine the cause and correct the problem before resumption of testing. Repetitive testing to achieve acceptable test results without identifying the cause or correction of a problem in a previous test is not acceptable as a means to establish or verify operability and may constitute "preconditioning." See NRC Information Notice 97-16, "Preconditioning of Plant Structures, Systems, and Components Before ASME Code Inservice Testing or TS Surveillance Testing."

A.9 Reduced Reliability

Reliability is a measure of the confidence in the ability of an SSC to perform its specified safety function(s) when required. When an SSC experiences multiple failures, especially repetitive failures (i.e., failures for the same or a similar cause) such as those addressed in Maintenance Rule[5] programs, and when the failures exceed the number of expected failures based on operating experience, the reliability of the affected SSC is reduced. An SSC that has been identified as having reduced reliability should be assessed for operability in accordance with Section 4, "Operability Determination Process." When an SSC's reliability is reduced to the point where there is no longer confidence that it can perform its specified safety function, the SSC is inoperable.

A.10 Flaw Evaluation/Operational Leakage

Flaws that are identified in Technical Specification systems or components while online and during plant activities, such as operator rounds, engineering walkdowns, and maintenance activities need to be assessed for operability. While ASME Section XI Executive Committee supports the position that ASME Section XI requirements are limited to Code repair or replacement activities when outside of Code examination windows, the NRC inspection guidance is more restrictive and the NRC acknowledges that its position is contrary to ASME Section XI Executive Committee Code interpretations (XI-1-92-03 & XI-1-92-19 Question 2). The NRC's position in IMC-0326, "Operability Determinations" is; "*the provisions of the ASME BPV Code Sect XI are incorporated by reference in 10CFR50.55a and are applicable at all times because they do not, by their own terms, limit application to ASME Code examinations. For potentially degraded components discovered between in-service inspections, licensees may use reasonable engineering judgement to determine whether the component is operable unless the ASME Code explicitly states otherwise.*" [6]

Based on the NRC's position in IMC-0326 described above, the following guidance is provided for consideration when assessing operability in ASME Class 1, 2, and 3 piping or components including situations where NRC accepted Code cases or other NRC approved alternative methods could not be applied.

Since ASME Class 1 components provide a necessary and required support function for a variety of required Emergency Core Cooling Systems as part of the Reactor Coolant System boundary, satisfaction of Code acceptance standards is generally required for meeting structural integrity requirements in support of an Operability Determination. Alternative methods or evaluation cannot be used to accept through-wall or through-weld leakage in Class 1 components.

When assessing operability for Class 2 or 3 systems, the SRO will perform the operability determination based on the evidence collected and available at the time. In most cases, this will be limited information without detailed structural integrity evaluation information available. RG 1.147 provides a list of NRC accepted ASME Code cases that can be used when evaluating structural integrity as follow up information in support of the initial operability determination. If NRC approved code cases or other NRC approved alternate methods are not available to be used, licensee's technical resources should use other alternative evaluation methods as outlined in Appendix A.2. These methods can be used to determine or conservatively bound the size, configuration, and location of flaws using volumetric or other nondestructive examinations (NDE) techniques. Compensatory actions, as defined in Definition 3.1

[5] 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants."

[6] IMC-0326, "Operability Determinations, Section 08.12, Flaw Evaluation."

and described in Appendix A.3 may be required to monitor flaw growth and/or operational leakage to ensure the assumptions in the Operability Determination is maintained until such time the deficient condition is resolved. The use of an alternative evaluation method in itself does not require the licensee to declare the SSC inoperable provided the alternative method determines that structural integrity is demonstrated.

In addition to the Operability Determination process, technical staff personnel should ensure actions IAW ASME Code Section XI are reviewed and followed in parallel to meet the regulatory requirements of 10CFR50.55a which may include submittal of a Code relief request for NRC approval.

A.11 Support System Impact on Operability

The definition of operability assumes that an SSC described in TS can perform its specified safety function when all necessary support systems are capable of performing their related support functions. In some cases, engineering judgment may be used in determining whether a support system that is not described in TS is necessary and is, therefore, required to be capable of performing its related support function. Engineering principles may be applied in the final analysis of the basis for the decision. For example, a ventilation system may be required in the summer to ensure that SSC can perform their specified safety functions, but may not be required in the winter. Similarly, the electrical power supply for heat tracing may be required in the winter to ensure that SSC can perform their specified safety functions, but may not be required in the summer. In all such cases, the basis for determining that a support system is not required should be periodically reviewed to ensure (a) that the conclusion remains valid, and (b) that there is timely restoration of the support system (the review may be done as part of the corrective action program). As an alternative to restoration, the support function could be modified (as with any other change to the facility) by following the 10 CFR 50.59 change process and updating the UFSAR.

Upon discovery of a support system that is not capable of performing its related support function(s), the most important consideration is the possibility of having lost all capability to perform a specified safety function. Upon declaring a support or supported system inoperable in one train, the required actions in the TS should be implemented. It should be verified that the facility has not lost the complete capability to perform the specified safety function. The word "verify" as used here covers examining logs or other information to determine if required features are out of service for maintenance or other reasons. The TS may contain specific requirements or allowances regarding support systems.

APPENDIX B: DEFINITION OF SPECIFIED SAFETY FUNCTION

The ability to perform a specified safety function is the central concept in operability. The following describes the basis of the definition of specified safety function used in this document.

B.1 Development of the Definition of Operability

In December 1968, the Atomic Energy Commission (AEC) revised the regulations for Technical Specifications. 10 CFR 50.36(b) states:

> "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to § 50.34. The Commission may include such additional technical specifications as the Commission finds appropriate."

The revised rule required TS for five categories of requirements: (1) safety limits and limiting safety system settings, (2) limiting conditions for operation, (3) surveillance requirements, (4) design features, and (5) administrative controls. The Statements of Consideration for the rule change stated:

> "In the revised system, emphasis is placed on two general classes of technical matters: (1) Those related to prevention of accidents, and (2) those related to mitigation of the consequences of accidents. By systematic analysis and evaluation of a particular facility, each application is required to identify at the construction permit state those items that are directly related to maintaining the integrity of the physical barriers designed to contain radioactivity. Such items are expected to be the subjects of Technical Specifications in the operating license."

The Statements of Consideration for the 1968 rule change referenced a document prepared by the AEC staff, "Guide to Content of Technical Specifications for Nuclear Reactors." In the discussion of "limiting conditions for operation," the guide states, "it is intended that technical specifications establish the lowest acceptable level of performance for a system or component, or the minimum number of components or portion of the system that must remain operable in order that plant operation may continue."

The first Standard Technical Specifications (STS) for each reactor design reflecting the 1968 rule were published in 1975 through 1977. These STS contained nearly identical definitions of operability[7]:

> "A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment, that are required for the system, subsystem, train, component or device to perform its function(s), are also capable of performing their related support function(s)."

Before the STS were published in 1975 through 1977, 33 operating licenses had been issued. These licenses had varying definitions of operability. In April 1980, the NRC issued a letter to all licensees (later

[7] There is one exception. The NUREG-0452 (Westinghouse plant) definition stated "electric power" instead of "normal and emergency electric power sources." This difference was retained through all four revisions of NUREG-0452.

referred to as Generic Letter (GL) 80-30). It required all licensees to submit proposed changes to the TS within 30 days to revise the definition of operability to that given in the STS.

Following the 1979 accident at Three Mile Island, the NRC and the industry expressed concern that the size and complexity of the Technical Specifications may be detrimental to safety. Each Owner's Group proposed improved STS and in 1991 the NRC published for comment draft improved STS for each reactor type. The draft improved STS retained the GL 80-30 definition of operability:

> "A system, subsystem, train, component, or device shall be OPERABLE when it is capable of performing its specified function(s) and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication, or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified function(s) are also capable of performing their related support function(s)."

The draft improved STS included Section 5.8, "Operability Definition Implementation Principles and Rules." This section gave general guidance on operability and, in particular, the effect of inoperable support systems on supported systems. It stated, "The specified function(s) of the system, subsystem, train, component, or device (hereafter referred to as system) is that specified safety function(s) in the licensing basis for the facility."

In 1993, the NRC issued final improved STS NUREGs after considering extensive comments. Section 5.8 was removed. The statement in Section 5.8 equating the "specified function(s)" with the "specified safety function(s)" was retained by a change to the definition of operability:

> "A system, subsystem, train, component, or device shall be OPERABLE when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified function(s) are also capable of performing their related support function(s)."

This definition of operability has not changed since Revision 0 of the improved STS.

The TS of all operating plants should have either the GL 80-30 definition of operability or the improved STS definition of operability. As the majority[8] of operating plant TS are based on the improved STS, the improved STS definition will be used in this document. The term "specified function(s)" in the GL 80-30 definition is equivalent to the improved STS term "specified safety function(s)".

In the TS, a system, subsystem, train, component or device is required to be operable by a Limiting Condition for Operability (LCO). Per LCO 3.0.1, LCOs are only required to be met during the Applicability of the TS; therefore, a system, subsystem, train, component or device is only required to be operable when in the Applicability of the LCO. Systems which provide required support functions for supported systems outside of the Applicability of the support system LCO are not required to be operable, but may be required to provide a necessary support function.

In the improved STS, the LCO section of the Bases describes what is required for operability for the subject system. This does not alter the definition of operability, but explains how the definition is

[8] As of July 2017, 75 operating plants have TS based on the improved STS.

applied to that system. For example, NUREG-1430 TS 3.5.1, "Core Flood Tanks," requires two Core Flood Tanks (CFTs) to be operable. The LCO Bases state, "For a CFT to be considered OPERABLE, the isolation valve must be fully open, power removed above [2000] psig, and the limits established in the SR for contained volume, boron concentration, and nitrogen cover pressure must be met."

B.2 Final Policy Statement on Technical Specifications Improvements

On July 16, 1993, the Commission approved the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors."

The Commission's policy stated, "The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety by identifying those features that are of controlling importance to safety and establishing on them certain conditions of operation which cannot be changed without prior Commission approval."

The Final Policy Statement contained criteria describing the requirements that should be included as Limiting Conditions for Operation in a plant's TS. The criteria and accompanying discussion are included below.

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

> Discussion: A basic concept in the adequate protection of the public health and safety is the prevention of accidents. Instrumentation is installed to detect significant abnormal degradation of the reactor coolant pressure boundary so as to allow operator actions to either correct the condition or to shut down the plant safely, thus reducing the likelihood of a loss-of-coolant accident.
>
> This criterion is intended to ensure that Technical Specifications control those instruments specifically installed to detect excessive reactor coolant system leakage. This criterion should not, however, be interpreted to include instrumentation to detect precursors to reactor coolant pressure boundary leakage or instrumentation to identify the source of actual leakage (e.g., loose parts monitor, seismic instrumentation, valve position indicators).

Criteria 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.

> Discussion: Another basic concept in the adequate protection of the public health and safety is that the plant shall be operated within the bounds of the initial conditions assumed in the existing Design Basis Accident and Transient analyses and that the plant will be operated to preclude unanalyzed transients and accidents. These analyses consist of postulated events, analyzed in the FSAR, for which a structure, system, or component must meet specified functional goals. These analyses are contained in Chapters 6 and 15 of the FSAR (or equivalent chapters) and are identified as Condition II, III, or IV events (ANSI N18.2) (or equivalent) that either assume the failure of or present a challenge to the integrity of a fission product barrier.

As used in Criterion 2, process variables are only those parameters for which specific values or ranges of values have been chosen as reference bounds in the Design Basis Accident or Transient analyses and which are monitored and controlled during power operation such that process values remain within the analysis bounds. Process variables captured by Criterion 2 are not, however, limited to only those directly monitored and controlled from the control room. These could also include other features or characteristics that are specifically assumed in Design Basis Accident and Transient analyses even if they cannot be directly observed in the control room (e.g., moderator temperature coefficient and hot channel factors).

The purpose of this criterion is to capture those process variables that have initial values assumed in the Design Basis Accident and Transient analyses, and which are monitored and controlled during power operation. As long as these variables are maintained within the established values, risk to the public safety is presumed to be acceptably low. This criterion also includes active design features (e.g., high pressure/low pressure system valves and interlocks) and operating restrictions (pressure/temperature limits) needed to preclude unanalyzed accidents and transients.

Criteria 3: A structure, system, or component 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.

Discussion: A third concept in the adequate protection of the public health and safety is that in the event that a postulated Design Basis Accident or Transient should occur, structures, systems, and components are available to function or to actuate in order to mitigate the consequence of the Design Basis Accident or Transient. Safety sequence analyses or their equivalent have been performed in recent years and provide a method of presenting the plant response to an accident. These can be used to define the primary success paths.

A safety sequence analysis is a systematic examination of the actions required to mitigate the consequences of events considered in the plant's Design Basis Accident and Transient analyses, as presented in Chapters 6 and 15 of the plant's FSAR (or equivalent chapters). Such a safety sequence analysis considers all applicable events, whether explicitly or implicitly presented. The primary success path of a safety sequence analysis consists of the combination and sequences of equipment needed to operate (including consideration of the single failure criteria), so that the plant response to Design Basis Accidents and Transients limits the consequences of these events to within the appropriate acceptance criteria.

It is the intent of this criterion to capture into Technical Specifications only those structures, systems, and components that are part of the primary success path of a safety sequence analysis. Also captured by this criterion are those support and actuation systems that are necessary for items in the primary success path to successfully function. The primary success path for a particular mode of operation does not include backup and diverse equipment (e.g., rod withdrawal block which is a backup to the average power range monitor high flux trip in the startup mode, safety valves which are backup to low· temperature overpressure relief valves during cold shutdown).

Criteria 4: A structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.

Discussion: It is the Commission policy that licensees retain in their Technical Specifications LCOs, action statements and Surveillance Requirements for the following systems (as applicable), which operating experience and PSA have generally shown to be significant to public health and safety and any other structures, systems, or components that meet this criterion:

- Reactor Core Isolation Cooling/Isolation Condenser,
- Residual Heat Removal,
- Standby Liquid Control, and
- Recirculation Pump Trip.

The Commission" recognizes that other structures, systems, or components may meet this criterion. Plant- and design-specific PSAs have yielded valuable insight to unique plant vulnerabilities not fully recognized in the safety analysis report Design Basis Accident or Transient analyses. It is the intent of this criterion that those requirements that PSA or operating experience exposes as significant to public health and safety, consistent with the Commission's Safety Goal and Severe Accident Policies, be retained or included in Technical Specifications.

The Commission expects that licensees, in preparing their Technical Specification related submittals, will utilize any plant-specific PSA or risk survey and any available literature on risk insights and PSAs. This material should be employed to strengthen the technical bases for those requirements that remain in Technical Specifications, when applicable, and to verify that none of the requirements to be relocated contain constraints of prime importance in limiting the likelihood or severity of the accident sequences that are commonly found to dominate risk. Similarly, the NRC staff will also employ risk insights and PSAs in evaluating Technical Specifications related submittals. Further, as a part of the Commission's ongoing program of improving Technical Specifications, it will continue to consider methods to make better use of risk and reliability information for defining future generic Technical Specification requirements.

In August 1995, the NRC added the four criteria in the Commission Policy Statement to the regulations as 10 CFR 50.36(c)(2)(ii), with the introduction, "A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of the following criteria."

The statements of consideration for the rule change stated:

> “The Commission has decided not to withdraw the final policy statement because it contains detailed discussions of the four criteria and guidance on how the NRC staff and licensees should apply the criteria.”

The Commission’s description of Criterion 2 included a reference to ANSI N18.2 Condition II, III, and IV events. Section 2 of ANSI N18.2-1973 describes these events caused by equipment failure or human error:

“2. General Design Considerations

2.1.2 Condition II: Incidents of Moderate Frequency …. may occur during a calendar year ….[examples include structure, system and component malfunctions and operator errors that may be expected to occur with moderate frequency] ….

2.1.3 Condition III: Infrequent Incidents …. May occur during the lifetime of a particular plant …. [examples include more significant, less frequent structure, system and component malfunctions and more significant, less frequent operator errors] ….

2.1.4 Condition IV: Limiting Faults …. Faults that are not expected to occur, but are postulated because their consequences would include the potential for the releases of significant amounts of radioactive material…. [examples include major structure, system and component malfunctions].”

NUREG-0800, Standard Review Plan, Section 15, divides events into Anticipated Operational Occurrences (AOOs) and Postulated Accidents. AOOs are ANSI N18.1 Condition 2 and 3 events. Postulated Accidents are Condition 4 events.

B.3 Regulatory Foundation

The four criteria in 10 CFR 50.36(c)(2)(ii) were added in August 1995, and are based on the July 16, 1993, "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors."

The statements of consideration for the 10 CFR 50.36 rule change stated:

> “The Commission has decided not to withdraw the final policy statement because it contains detailed discussions of the four criteria and guidance on how the NRC staff and licensees should apply the criteria.”

This document establishes the regulatory foundation of the definition of specified safety function as:

- 10 CFR 50.36(c)(2)(ii) requires an LCO be established on an SSC if it meets one of the criteria. (CRITERIA = LCO)
- A TS LCO requires an SSC to be operable, equating LCO compliance with SSC operability. (LCO = OPERABILITY)
- The TS definition of operability states that an operable SSC must be capable of performing its specified safety functions, equating operability with specified safety functions. (OPERABILITY=SSF)
- Therefore, the regulations and the TS establish a link between the criteria in 10 CFR 50.36(c)(2)(ii) and the specified safety functions of an SSC.

CRITERIA = LCO = OPERABILITY = SPECIFIED SAFETY FUNCTIONS

The regulatory foundation for defining "Specified Safety Function" should be based on the criteria for selecting Limiting Conditions for Operation (LCOs) given in 10 CFR 50.36.

For the three-quarters of the licensees that have converted their TS to the STS, the conversion license amendment request, reviewed and approved by the NRC, compared the plant-specific design and licensing basis against the 50.36 criteria. Therefore, the proposed approach links a plant's design and licensing basis, as described in Chapters 6 and 15 of the UFSAR, with the LCOs in TS and the specified safety functions required for operability

B.4 Specified Safety Function Definition

Based on the regulatory foundation given above, the definition of specified safety function is:

> "A Specified Safety Function (SSF) is a function of controlling importance to safety assumed to be performed by a system, structure, or component (SSC) in the analyses and evaluations summarized in the Updated Final Safety Analysis Report (UFSAR), typically Chapters 6 and 15 or the plant-specific equivalent chapters. These specified safety functions are needed to obviate the risk of an immediate threat to the public health and safety. SSFs are the subset of all SSC functions that meet one or more criterion in 10 CFR 50.36(c)(2)(ii), as described in the NRC's Final Policy Statement on Technical Specifications Improvement, unless otherwise stated in the docketed plant-specific SSF scope. Consequently, the SSFs may not be all of the SSC functions described in the UFSAR. The plant-specific SSF scope derives from the functions and design conditions for performance relied on by the licensee and the NRC when the Technical Specifications (TS) were prepared, submitted, reviewed, and approved. For plants with Standard Technical Specifications, these functions are typically discussed in the TS Limiting Condition for Operation (LCO) Bases."

<u>Derivation</u>

Bracketed numbers correspond to the subsequent discussion.

The first and second sentences state, "A Specified Safety Function (SSF) is a function of [1] *controlling importance to safety* assumed to be performed by a system, structure, or component (SSC) in the *[2] analyses and evaluations summarized in the Updated Final Safety Analysis Report (UFSAR), typically Chapters 6 and 15 or the plant-specific equivalent chapters. These specified safety functions are needed* to *[3] obviate the risk of an immediate threat to the public health and safety*."

These sentences are derived from the Commission's policy statement, and 10 CFR 50.36.

- The Commission's policy begins, "The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to *[3] obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety* by identifying those features that are of *[1] controlling importance to safety* and establishing on them certain conditions of operation which cannot be changed without prior Commission approval.

- The Commission's policy statement discussion of Criteria 2 and 3 discusses the safety sequence analyses initial conditions and mitigating actions presented in Chapters 6 and 15 of the plant's FSAR, which form the bounds of adequate protection of the public health and safety. Most, but not all, LCOs satisfy Criteria 2 or 3, so the reference is qualified by the term "typically."

- The definition states, "analyses and evaluations summarized in the Updated Final Safety Analysis Report (UFSAR), typically Chapters 6 and 15 or the plant-specific equivalent chapters." The analyses and evaluations summarized in Chapters 6 and 15 usually rely on capabilities and analyses described in other chapters of the UFSAR.

- 10 CFR 50.36(b) states, "The technical specifications will be derived from the *[2] analyses and evaluation included in the safety analysis report*, and amendments thereto, submitted pursuant to § 50.34."

The third and fourth sentences states, "*[1] SSFs are the subset of SSC functions that meet one or more criterion in 10 CFR 50.36(c)(2)(ii), as described in the NRC's Final Policy Statement on Technical Specifications Improvement, [2] unless otherwise stated in the docketed plant-specific SSF scope. [1] Consequently, the SSFs may not be all of the SSC functions described in the UFSAR."*

These sentences are derived from the Commission's Policy Statement, 10 CFR 50.36(b), NRC Technical Specifications Branch Task Interface Agreement (TIA) response, and an NRC training module.

- [1] The Commission's Policy states, *"LCOs which do not meet any of the criteria below [now in 10 CFR 50.36(c)(2)(ii)] may be proposed for removal from the Technical Specifications* and relocation to licensee-controlled documents, such as the FSAR." Logically, SSC functions that do not require establishment of an LCO cannot be an SSF that must be met in order to meet an LCO.

- [1] "Revised Response to Task Interface Agreement – Requirements for Testing Station Batteries for Station Black-Out Conditions at the San Onofre Nuclear Generating Station, TIA 2009-002," states, "In accordance with 10 CFR 50.36, TSs are derived from the analyses and evaluation in the safety analysis report and *TS testing is for structures systems and components that meet one or more criterion in 50.36(c)(2)(ii).*"

- [1] NRC Licensing Basis and Backfitting Workshop – Summer 2018 – Module 1 (Licensing and Design Bases," Slide 11, "Technical Specifications," "Intent is to ensure proper equipment is available to support mitigation of Chapter 15 Accident." This training is consistent with the Commission's Policy Statement Criteria 2 and 3 reliance on Chapter 15 analyses.

- [2] 10 CFR 50.36(b) states, "*The Commission may include such additional technical specifications as the Commission finds appropriate*." Not all TS satisfy one of the criteria in 10 CFR 50.36(c)(2)(ii), particularly in plant TS not based on the Standard Technical Specifications. In those cases, the TS (including Surveillance Requirements), TS Bases, or docketed correspondence related to establishment of the TS should describe the purpose of the LCO and the associated SSFs.

The fifth and sixth sentences state, *"[1] The plant-specific SSF scope derives from the functions and design conditions for performance relied on by the licensee and the NRC when the Technical Specifications (TS) were prepared, submitted, reviewed, and approved. [2] For plants with Standard Technical Specifications, these functions are typically discussed in the TS Limiting Condition for Operation (LCO) Bases."*

These sentences are derived from 10 CFR 50.36 and its Statements of Consideration, and the Writer's Guide for Plant-Specific Improved Technical Specifications, (TSTF-GG-05-01):

- [1] 10 CFR 50.36(b) states, "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, *submitted pursuant to § 50.34*." The Statements of Consideration for the 1968 revision to 10 CFR 50.36 states, "In the revised system, emphasis is placed on two general classes of technical matters: (1) Those related to prevention of accidents, and (2) those related to mitigation of the consequences of accidents. By systematic analysis and evaluation of a particular facility, *each application is required to identify at the construction permit* state those items that are directly related to maintaining the integrity of the physical barriers designed to contain radioactivity. *Such items are expected to be the subjects of Technical Specifications in the operating license*."

- *[2]* The Writer's Guide, Section 4.2.4, "Limiting Condition for Operation (LCO) (or Safety Limits)" [Bases], states:

    a. Define the precise scope of the LCO and explain why the requirement is appropriate.

    b. Discuss why it was determined to be the lowest functional capability or performance level for the system/component necessary for safe operation of the facility.

    c. Discuss the individual limits and their relationship to the protection of the fuel clad integrity, pressure boundary integrity or containment integrity. Discuss what parameters are measured and used to verify acceptance with the specified limit.

APPENDIX C: ADDITIONAL CONSIDERATIONS FOR CORRECTIVE ACTIONS OF DEFICIENT CONDITIONS

All licensees have a program that implements 10 CFR 50, Appendix B, Criteria XVI:

> XVI. Corrective Action
>
> Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.

The program may be expanded to include conditions that are not limited to those that fall under Criteria XVI (i.e., beyond safety related).

In addition to consideration of operability, plant conditions described in the body of this document are evaluated and corrected in accordance with Criteria XVI and the corrective action program. This attachment discusses additional considerations which may apply to resolution of the subset of conditions which are assessed in accordance with the operability process described in Section 4, “Operability Determination Process.”

C.1 Relationship Between Operability and the Corrective Action Program

The purpose of an operability determination is to provide a basis for making a timely decision on LCO compliance. Corrective actions taken to correct the deficient condition should be addressed through the corrective action process. The treatment of operability as a separate issue from the resolution of the deficient condition emphasizes that the operability determination process is focused on Technical Specification compliance and should not be affected by decisions or actions necessary to plan and implement corrective action.

C.2 Timing of Corrective Actions

A schedule should be established for completing a corrective action, as necessary when an SSC exhibits a deficient condition. Deficient conditions should be addressed in a time frame commensurate with the safety significance of the condition.

In determining the timing of corrective action, considerations are the safety significance, the effects on operability, the significance of the deficient condition, and what is necessary to implement the corrective action, as well as the time needed for design, review, approval, or procurement of the repair or modification; the availability of specialized equipment to perform the repair or modification; and whether the plant must be in hot or cold shutdown to implement the actions. The deficient condition should be resolved at the first available opportunity or appropriately justify a longer completion schedule. Factors that may be used when justifying a longer completion schedule may include (1) the identified cause, including contributing factors and proposed corrective actions, (2) existing conditions and compensatory actions, including the acceptability of the schedule for repair and replacement

activities, (3) the basis for why the repair or replacement activities will not be accomplished prior to restart after a planned outage (e.g., additional time is needed to prepare a design/modification package or to procure necessary components), and (4) review and approval of the schedule by appropriate site management and/or oversight organizations.

Deficient conditions calling for compensatory actions to restore SSC operability should have a higher priority than conditions that do not rely on compensatory actions to restore operability. The reason is that reliance on compensatory actions to restore SSC operability suggests a greater degree of degradation. Similarly, conditions calling for compensatory actions to restore operability, where the compensatory actions substitute manual operator actions for automatic actions to perform a specified safety function, should be resolved expeditiously.

C.3 Final Corrective Action

Final corrective action may involve (1) restoration of the deficient condition, (2) a change to the licensing basis to accept the deficient condition, or (3) some modification of the facility or licensing basis other than restoration.

If corrective action is taken to restore the deficient condition, no 10 CFR 50.59 screening evaluation is required. The 10 CFR 50.59 process applies when the final resolution of the deficient condition differs from the established Updated Final Safety Analysis Report (UFSAR) description or analysis.

However, if a change is made to the facility or procedures as described in the UFSAR, the review process established by 10 CFR 50.59 applies. A change can be safe, but still require NRC approval under the rule. The proposed final resolution may require staff review and approval (via license amendment) without affecting the continued operation of the plant because interim operation is governed by the processes for determining operability and taking corrective action (10 CFR Part 50, Appendix B).

In two situations, the identification of a final resolution or final corrective action requires a 10 CFR 50.59 review, unless another regulation applies (e.g., 10 CFR 50.55a): (1) when the final corrective action is to change the facility or procedures to something other than full restoration to the UFSAR described condition and (2) when the licensing basis, as described in the UFSAR, is changed to accept the deficient condition. Both situations are discussed in greater detail below.

In every case, including the need for a relief request in accordance with 10 CFR 50.55a, the need for NRC approval for a change does not affect the authority to operate the plant. Plant operation may continue with mode changes, restart from outages, etc., with deficient conditions provided that operations in these conditions do not violate the TS. The basis for this authority to continue to operate is that the TS contains the specific characteristics and conditions of operation necessary to avoid an abnormal situation or event that might give rise to an immediate threat to public health and safety.

The use of alternative methods is not subject to 10 CFR 50.59 unless the methods are used in the final corrective action. 10 CFR 50.59 is applicable upon implementation of the corrective action.

C.4 Change to Facility or Procedures in Lieu of Restoration

In this situation, the proposed final resolution of the deficient condition includes other changes to the facility or procedures to cope with the uncorrected or only partially corrected deficient condition. Rather than fully correcting the deficient condition, capability or margin is restored by making another

change. In this case, the change from the UFSAR-described condition to the final condition should be evaluated. If the 10 CFR 50.59 screening and/or evaluation concludes that a change to the TS is involved or the change meets any of the evaluation criteria specified in the rule for prior NRC approval, a license amendment must be approved, and the corrective action process is not complete until the approval is received or some other resolution occurs.

C.5 Acceptance of an As-Found Condition

In the other situation, the deficient condition is accepted. In this case, the 10 CFR 50.59 review covers the change from the UFSAR-described condition to the existing condition (i.e., exit the corrective action process by revising its licensing basis to document acceptance of the condition). If the 10 CFR 50.59 screening and/or evaluation concludes that a change to the TS is involved or the change meets any of the evaluation criteria specified in the rule for prior NRC approval, a license amendment must be approved and the corrective action process is not complete until the approval is received or some other resolution occurs. To resolve the deficient condition without restoring the affected SSC to its licensing basis, an exemption from 10 CFR Part 50 in accordance with 10 CFR 50.12 or relief from a design code in accordance with 10 CFR 50.55a may be required. The use of 10 CFR 50.59, 50.12, or 50.55a does not relieve the responsibility to comply with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for significant conditions adverse to quality to determine the cause, to examine other affected systems, to take corrective action to preclude repetition, and to report the original condition, as appropriate.

