OPERABILITY DETERMINATIONS & FUNCTIONALITY ASSESSMENTS FOR RESOLUTION OF DEGRADED OR NONCONFORMING CONDITIONS ADVERSE TO QUALITY OR SAFETY

TABLE OF CONTENTS

1.0 PURPOSE

This guidance is provided to NRC inspectors to assist their review of licensee determinations of operability and resolution of degraded and nonconforming conditions. In addition, many licensees have found this guidance useful in developing their plant-specific operability determination process (ODP). Users of the guidance should be aware that, although it generally reflects existing practice, it may not be directly applicable in every case at every plant. Therefore, inspectors should discuss significant differences among licensee practices with NRC management to ensure that the guidance is applied in a reasonable and consistent manner.

If, during an inspection, an NRC inspector obtains information reasonably indicating a degraded or nonconforming condition affecting any of the structures, systems, and components (SSCs) described in Section 2.0 (Scope and Applicability), the inspector should promptly inform the appropriate level of licensee management so that the licensee can evaluate the operability or functionality of the SSCs.

NRC regulations and the plant-specific operating license, including technical specifications, establish requirements for SSCs to ensure that plant operation does not pose an undue risk to public health and safety. Although these requirements limit the risk of plant operation, it is not possible to address all conceivable events or plant conditions.

The licensee's immediate and primary attention should be on the safety of the plant. When a degraded or nonconforming condition is identified that may pose an immediate threat to public health and safety, whether or not explicitly discussed in regulatory or licensee documents, the plant should be placed in a safe condition. Throughout the course of an operability determination, there must be a reasonable expectation that the SSC in question is operable and that the determination will support operability.

2.0 SCOPE and APPLICABILITY

Licensees assess operability and functionality when degraded or nonconforming conditions affecting SSCs are identified.

2.1 <u>Scope of SSCs for Operability Determinations</u>

The ODP is used to assess operability of SSCs described in TS. The scope of SSCs considered by the ODP is:

a. SSCs explicitly described in the technical specifications (TS), hereafter referred to as "SSCs described in TS." SSCs described in TS are required to be operable by a TS Limiting Condition for Operation (LCO) statement. The scope of SSCs described in TS is specified in the LCO section of the TS Bases for some, but not all, plants. These SSCs may perform required support functions for other SSCs required to be operable by a TS LCO (e.g., emergency diesel generators and service water), and

b. SSCs that are not explicitly required to be operable by a TS LCO statement, but which perform required support functions (as specified by the TS definition of operability) for SSCs that are required to be operable by a TS LCO.

2.2 Scope of SSCs for Functionality Assessments

For functionality, this guidance is applicable to SSCs that are not described in TS, but are in the current licensing basis (CLB). Licensees should have an effective program for problem identification and corrective action that assesses any degraded or nonconforming condition to determine the functionality of these SSCs, consistent with safety significance. For example, guidance on functionality would apply to SSCs that are not described in TS but are:

a. relied on in the safety analyses or plant evaluations that are a part of the CLB,
b. subject to 10 CFR 50, Appendix A, Criterion 1, "Quality Standards and Records,"
c. subject to 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," or
d. within the scope of 10 CFR 50.65, the maintenance rule.

3.0 DEFINED TERMS

3.1 Current Licensing Basis (CLB): The current licensing basis is the set of NRC requirements applicable to a specific plant, and a licensee's 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 license, that are docketed and in effect.

The CLB includes:

a. NRC regulations in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 72, 73, 100 and appendices thereto
b. Commission Orders
c. License conditions
d. Exemptions
e. Technical Specifications
f. 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)
g. Licensee commitments remaining in effect that were made in docketed licensing correspondence (such as licensee responses to NRC bulletins, generic letters, and enforcement actions)
h. Licensee commitments documented in NRC safety evaluations

3.2 Degraded Condition: A degraded condition is a condition of a SSC in which quality or functional capability has been reduced. Examples of conditions that can reduce the quality include, but are not limited to, failures, malfunctions, deficiencies, deviations, defective material, and equipment. Examples of conditions that can reduce the capability of a system include (but are not limited to) aging, erosion, corrosion, improper operation, and or maintenance.

3.3 Design Bases: Design bases information, defined by 10 CFR 50.2,[1] is documented in the updated final safety analysis report (UFSAR) as required by 10 CFR 50.71. The design basis of safety related SSCs is established initially during original plant licensing and relates primarily to the accident mitigation functions of safety related SSCs. The design basis of safety related SSCs is a subset of the CLB.

3.4 Fully Qualified: A SSC is considered fully qualified when it conforms to all aspects of its CLB, including all applicable codes and standards, design criteria, safety analyses assumptions and specifications, and licensing commitments. Operation with fully qualified SSCs ensures that safety margins are maximized. A SSC is considered to be "not fully qualified," i.e., degraded or nonconforming, when it does not conform to all aspects of its CLB, including all applicable codes and standards, design criteria, safety analyses assumptions and specifications, and licensing commitments.

The SSCs that fall within the scope of operability are designed and operated, as described in the CLB, with design margins and engineering margins of safety to ensure, among other things, that some loss of quality does not mean immediate failure to meet a specified function. The CLB includes commitments to specific codes and standards, design criteria, and some regulations that also dictate margins. Many licensees add conservatism so that a partial loss of quality does not affect their commitments for design and operational margin. The loss of conservatism that is not credited in the CLB does not affect operability or functionality.

Refer to Table 1 for SSC qualification and operability status when degraded or nonconforming conditions are identified and evaluated.

3.5 Functional - Functionality: Functionality is an attribute of SSCs that are not controlled by TS LCOs. A SSC shall be functional or have functionality when it is capable of performing its specified function. Functionality does not apply to SSFs, but does apply to the ability of non-TS SSCs to perform other SFs that are a necessary and support function.

3.6 Functions: This section differentiates the STS definition of operability terms (Section 3.9) "specified function" (SF), "specified safety function" (SSF), and "necessary and related support function."

3.6.1 Specified Function: A specified function (SF) is a function performed by a SSC in the CLB. SFs are the functions the SSC was designed to accomplish, as described in the UFSAR and other CLB documents.

[1] 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."

3.6.2 Specified Safety Function: The definition of operability states in part that "an SSC shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s)." Specified safety functions (SSF) are a subset of the set of SFs. In the context of this manual chapter, a SSF is a function performed by a SSC described in TS . Note that not all functions of TS SSCs are considered SSFs. For each licensee, the plant-specific SSF scope derives from information relied on by the licensee and the NRC when the TS were prepared, submitted, reviewed and approved. The SSC scope is intended to address design-basis events. For some plants, additional events, beyond the scope of design-basis events (such as station blackout and ATWS), may have been included when the plant-specific SSF scope was established. SSC specified safety function(s) are usually stated in the Bases of the TS and the plant UFSAR. The primary sources for deciding whether a specified function is a specified safety function are the application and supplements submitted by the licensee and the requests for additional information and safety evaluations prepared by the NRC in the development of the TS.

3.6.3 Necessary and Related Support Function: Necessary and related support functions are a subset of the SSCs specified function(s) discussed in the CLB for the plant. A necessary and related support function is a function of a SSC that is necessary to support operability of a SSC described in TS. The phrase necessary and related derives from the definition of operability in Section 3.9. SSCs that provide necessary and related support functions may be described in TS or not described TS. If they are in described in TS, the term "operable" applies to them (Section 2.1.a). If they are not described in TS, the term "operable" does not apply to them (Section 2.1.b) directly, however these SSCs are still within the scope of the ODP (Section 4.0) because their lack of functionality can affect the operability of SSCs described in TS. Appendix C.8 provides additional guidance on support/supported system relationships to be considered.

3.7 Nonconforming Condition: A nonconforming condition is a condition of a SSC that involves a failure to meet the CLB or a situation in which quality has been reduced because of such factors as improper design, testing, construction, or modification. The following are examples of nonconforming conditions:

a. A SSC fails to conform to one or more applicable codes or standards (e.g., CFR, operating license, technical specifications, UFSAR, and licensee commitments).

b. An as-built or as-modified SSC does not meet CLB requirements.

c. Operating experience or engineering reviews identify a design inadequacy.

d. Documentation required by NRC requirements such as 10 CFR 50.49 is unavailable or deficient.

3.8 Operability Declaration: An operability declaration is a decision by the on-shift licensed operators in the control room that there is reasonable expectation that a SSC can perform its SSF.

3.9 Operable -Operability: The Standard Technical Specifications (NUREGs 1430-1434) 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 functions, 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 function(s) are also capable of performing their related support function(s)."

There are several variations in existing plant specific TS of the above basic definition. Therefore, some judgement is required in application of this guidance on operability. Word differences that exist are not viewed by the NRC to imply any significant overall difference in application of the plant specific TS. Any problems that result from existing inconsistencies between a plant-specific definition of operability and this guidance should be discussed with regional managers, who should discuss the issues with NRR if deemed necessary. In all cases, a licensee's plant-specific definition is governing.

Note that some licensees use the term “operable” in non-TS applications. The ODP described in this document does not apply to those applications.

A SSC must be capable of performing the specified safety function(s) required by its design, within the required range of physical conditions, initiation times, and mission times. In addition, TS operability considerations require that a SSC meet all surveillance requirements (as specified in Surveillance Requirement (SR) Applicability SR 3.0.1). A SSC that does not meet a SR must be declared inoperable. For operability determination purposes, the mission time is the duration of SSC operation following an accident that is credited in the UFSAR for the SSC to perform its specified safety function.

3.10 Reasonable Expectation: The discovery of a degraded or nonconforming condition may bring the operability of one or more SSCs into question. A subsequent determination of operability must be predicated on the licensee’s “reasonable expectation” that the SSCs are operable and that the ODP will support that expectation. Reasonable expectation does not mean absolute assurance that the SSCs are operable. Nevertheless, the preponderance of evidence should establish that the SSCs are more likely operable than not operable. For example, evidence may show that the probability of failure of a SSC has increased, but not to the point of eroding confidence in the “reasonable expectation” of SSC operability. Regardless, there is no such thing as an indeterminate state of operability; a SSC is either operable or inoperable.

4.0 OPERABILITY DETERMINATION PROCESS

Determinations of operability are appropriate whenever a review, TS surveillance, or other indication calls into question the ability of SSCs to perform specified safety functions. If an immediate threat to public health and safety is identified, actions should be completed expeditiously to place the plant in a safe condition.

4.1 Review Activities

The process of reviewing the performance of SSCs and ensuring their operability is continual. There are many activities that provide an ongoing review of SSCs where potential degraded or nonconforming conditions may be discovered .

The activities include, but are not limited to, the following:

a. Additions to facilities
b. Day-to-day operation of the facility
c. Design modifications to facilities
d. Engineering design reviews including design basis reconstitution
e. Examinations of records
f. Implementation of programs such as inservice testing and inspection
g. Maintenance activities
h. NRC inspections
I. Observations from the control room
j. Operational event reviews
k. Operational experience reports
l. Part 21 notifications
m. Plant walk downs or tours
n. Plant system walk downs
o. Quality assurance activities such as audits and reviews
p. SSC performance reviews (including common mode failures)
q. Vendor reviews or inspections

TS surveillances are performed periodically to verify that SSCs are operable. Satisfactory performance of a surveillance usually is considered sufficient to demonstrate operability. However, if conformance to criteria in the CLB that are both necessary and sufficient to establish operability cannot be established with reasonable assurance, then performance of the surveillance requirement may not, by itself, be sufficient to establish operability. Failure to conform to CLB criteria that are not needed to demonstrate operability should be addressed by the appropriate licensee process.

An example would be the satisfactory completion of a TS surveillance, but with results that exhibit a degrading trend, that indicates that the acceptance criteria could be exceeded before the next surveillance test.

4.2 Potential Degraded or Nonconforming Conditions

When a potential degraded or nonconforming condition is identified, the licensee should take action, without delay, to confirm if an SSC is degraded or nonconforming. For example, licensees should not wait to complete extensive evaluations before entering the condition into their problem identification/corrective action process.

Where there is reason to question that entering a degraded or nonconforming condition into their problem identification/corrective action process is not, or was not performed without delay, the Region may, with NRR consultation as appropriate, request that the licensee provide an explanation of the perceived delay.

4.3 Presumption of Operability

The TS are organized and implemented presuming a system is operable. Without information to the contrary, it is reasonable to assume that once a system or component is established as operable it will remain operable. The previous verification of operability (e.g., surveillance, or operability determination) provides that assurance. For example, a presumption of operability might be appropriate if the record of the results of a test or surveillance is found to be missing but the licensee has other methods to verify that the activity was, in fact, successfully accomplished (e.g., log entries). However, it would not be appropriate to presume operability based the future results of an analysis when there is not a reasonable expectation that the system can perform its specified safety function during the interim. In other words, both "reasonable expectation of operability" and "presumption of operability" are based largely on judgments derived from specific sets of facts.

TS surveillances are performed periodically to verify that SSCs are operable. Satisfactory performance of a surveillance usually is considered sufficient to demonstrate operability. However, if conformance to criteria in the CLB that are both necessary and sufficient to establish operability cannot be established with reasonable assurance, then performance of the surveillance requirement may not, by itself, be sufficient to establish operability. Failure to conform to CLB criteria that are not needed to demonstrate operability should be addressed by the appropriate licensee process. An example would be the satisfactory completion of a TS surveillance, but with results that exhibit a degrading trend, that indicates that the acceptance criteria could be exceeded before the next surveillance test.

4.4 Scope of Determinations/Comparison to Current Licensing Basis

The scope of an operability determination needs to be sufficient to address the capability of SSCs to perform their specified safety functions. The operability decision may be based on analysis, a test or partial test, experience with operating events, engineering judgment, or a combination of these factors taking into consideration SSC functional requirements.

a. Operability determinations should include:

(1) Which SSCs are affected by the degraded or nonconforming condition.

(2) The CLB requirements or commitments established for the affected SSCs.

(3) The specified safety function(s) performed by the affected SSCs.

(4) The effect or potential effect of the degraded or nonconforming condition on the affected SSCs' ability to perform specified safety functions.

(5) If a reasonable expectation of operability exists, including the basis for the determination and any compensatory measures put in place to establish or restore operability.

b. The following should be considered when performing operability determinations:

(1) Design basis events are plant specific; and technical specifications, bases, and safety evaluations may contain plant-specific considerations related to operability.

(2) The SSC operability requirements are based on safety analysis of specific design basis events for one mode or specified condition of operation and may not be the same for other modes or conditions of operation, so all applicable modes and conditions of operation should be considered.

(3) A SSC operability requirements extend to all of its necessary support systems (per the TS definition of Operability) regardless of whether the TS explicitly specify operability requirements for those support functions.

(4) The occurrence of multiple (simultaneous) design basis events should be considered only to the extent that they are described in the plant current licensing basis.

4.5 Circumstances Requiring An Operability Determination

Licensees should enter the ODP upon discovery of any of the following circumstances when the operability of any SSC described in TS is called into question, however, a reasonable expectation of operability must exist:

a. Degraded conditions
b. Nonconforming conditions
c. Existing but previously unanalyzed conditions

See Sections 2.1.b, 3.6.3 and Appendix C.8 for discussions of the relationship between related support functions and the operability of SSCs described in TS.

If a SSC is clearly inoperable (e.g., loss of motive power or failed TS surveillance), it must be declared inoperable and the ODP need not be entered. Note that there may be other licensee processes and programs that may need to be considered (e.g., availability, maintenance rule, reportablility) when SSCs are declared inoperable.

4.6 Timing of Operability Determinations

The amount of time taken to perform an operability determination should be commensurate with the safety significance of the issue. Entry into the operability determination process requires, as a minimum, that an immediate operability determination be performed, and may also require that a prompt operability determination be performed. Appendix C of this manual chapter provides additional guidance for particular circumstances. If a reasonable expectation of operability does not exist at any point during the operability determination, the SSC must be declared inoperable.

Where there is reason to question that the timing of a determination is not, or was not performed without delay, the Region may, with NRR consultation as appropriate, request that the licensee provide an explanation for the perceived delay.

4.6.1 Immediate Determination

A determination of SSC operability should be made immediately after confirmation of the circumstances described in Section 4.5. The determination should be made without delay and in a controlled manner using the best available information. Licensees should not extend the time period of the determination to wait for the results of detailed evaluations. While the determination is in progress, operators should remain aware of the status of affected SSCs. The immediate determination should document the basis for concluding that a reasonable expectation of operability exists . When a reasonable expectation of operability does not exist, the SSC(s) should be declared inoperable.

4.6.2 Prompt Determination

A prompt determination is required when additional information is needed to increase the level of reasonable expectation provided by the immediate determination. For example, if an immediate determination is based on best-available information and the plant staff needs to perform additional supporting analysis, information from the analysis should be incorporated into the prompt determination.

A prompt determination, when required, must be performed without delay. Licensees should make continual progress toward completing the determination. A reasonable expectation of operability must exist while the prompt determination is being completed.

A prompt determination is not always necessary. For example:

a. If a component is declared inoperable and taken out of service to make repairs, a prompt determination (i.e., the generation of additional information about the inoperability) is not necessary.

b. If sufficient information was available at the time of the immediate determination, and new information will not change the outcome, a prompt determination is not necessary.

There is no explicit time requirement for the completion of a prompt determination. Nevertheless, timeliness is important and should be based on the safety significance of the issue. For example, it may be appropriate to make the prompt operability determination within a few hours for situations involving SSCs with high safety significance. Prompt determinations can often be made within approximately 24 hours of discovery, even if complete information is not available. If more time is needed to gather additional information, such as a vendor analysis or calculation, the licensee can evaluate the risk importance of the additional information to decide if it is appropriate to prolong completion of the final operability determination.

TS completion time is one indicator of safety significance that can be used when determining an appropriate time period for completing a prompt determination.

4.7 Documentation

Operability determinations should be documented and sufficiently detailed so an individual knowledgeable in the technical discipline associated with the condition would be expected to understand its basis. Documentation of assumptions would be sufficient for straightforward conditions, while detailed calculations may be necessary to support complex conditions. Adequate documentation is necessary to facilitate subsequent independent review.

The documentation for immediate determinations need not be extensive. Plant record systems, such as operator logs or the corrective action program, are often sufficient.

The documentation for prompt determinations should include additional information necessary to support a reasonable expectation that the SSC is operable. Supporting information should be included or appropriately referenced. This documentation should describe the scope and basis of the determination, which may include items discussed in Section 4.4.

4.8 Operator Awareness and Responsibilities

The operating shift crew is responsible for overall control of facility operation. As part of that responsibility, the on-shift licensed operators in the control room must be aware of the operability and functionality of plant SSCs, as well as the status of degraded or nonconforming conditions that may affect plant operation. A senior licensed operator with responsibility for plant operations makes the declaration of operability, i.e., “makes the call” of whether a SSC described in TS is either operable or inoperable (Section 3.8).

Plant staff in other organizations (e.g., operations, engineering, and licensing) that are knowledgeable in the subject matter and possess appropriate knowledge of plant operations may perform operability determinations. However, it is the responsibility of those performing the evaluation of degraded or nonconforming conditions to inform the licensed operators responsible for operating the plant of the discovery and status of evaluations that affect plant operation.

5.0 FUNCTIONALITY ASSESSMENT

5.1 Functional

Functionality and operability are similar but separate concepts. While licensees have a specific ODP for making operability determinations for SSCs described in TS including consideration for necessary and related support functions (Sections 2.1.b, 3.6.3 and Appendix C.8), they do not, as a general rule, have a specific process for evaluating the functionality of SSCs not described in TS. Normally the assessment of functionality is performed as part of other plant processes, such as the corrective action process. Appendix B of this Manual Chapter may be used to guide interim operation during the corrective action period for SSCs that are not functional. It is appropriate to consider safety significance in determining the appropriate depth of a functionality assessment . Also, the effect of non-functional SSCs on other regulatory requirements (e.g., Appendix R, station blackout, ATWS, environmental qualification, maintenance rule) should be determined.

5.2 Not Functional

If any SSCs not described in TS have been determined to be not functional, then the appropriate corrective actions should be taken. Note, that there may be other licensee processes and programs that may need to be considered (e.g., availability, maintenance rule, reportability) when SSCs are not functional. Similarly, if any SSCs not in TS have been determined to be functional, although a degraded or nonconforming condition is present, then the SSCs are considered functional but degraded or nonconforming and the appropriate corrective action should be taken.

6.0 OPERATIONS BASED ON OPERABILITY DETERMINATIONS

6.1 Inoperable

An SSC is considered inoperable and the associated LCO must immediately be declared not met for the following conditions:

a. A specified TS requirement is not satisfied.

b. A degraded or nonconforming condition results in the SSC being unable to perform its specified safety function. This could be determined immediately upon discovery of the condition, or during the immediate determination or prompt determination processes.

6.2 Operable But Degraded or Nonconforming

If a SSC described in TS is determined to be operable, even though a degraded or nonconforming condition is present, the SSC is considered "operable but degraded or nonconforming." For example, a SSC may be operable even though it may be in nonconformance with its environmental qualification requirements.

A SSC that is determined to be operable but degraded or nonconforming is considered to be in compliance with the TS, and the operability determination constitutes a basis for the licensee to continue operation.[2] This is consistent with the plant TS being the controlling document for making decisions about plant operations. The basis should be reviewed in an ongoing manner until corrective actions are successfully completed. SSCs that have been determined operable through an operability determination remain operable as long as the reasonable expectation of operability established by the operability determination remains valid.

The discovery of an improper or inadequate TS value or required action is considered a degraded or nonconforming condition. Additional guidance related to correction of plant TS when the are found to contain non-conservative values or specify incorrect actions is provided in Administrative letter 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety."

There may be cases where a licensee discovers a noncompliance with a regulation, and the noncompliance is not addressed by the operating license or the TS (i.e., the noncompliance has no impact on any SSF). For such cases, the licensee should determine if there is an immediate safety issue as a result of the noncompliance. The amount of time taken to complete the corrective action should be commensurate with the safety significance. Immediate action such as shutting down the plant may not be required, unless otherwise specified by NRC requirements. The licensee should determine if any other NRC requirements apply to the situation (e.g., 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action" or 10 CFR 50.12, "Specific Exemptions") and take any required action.

6.3 Operability is Separate from Corrective Action to Restore Full Qualification

The purpose of an operability determination is to provide a basis for making a timely decision pertaining to plant operation when a degraded or nonconforming condition is discovered. Corrective actions taken to restore qualification should be addressed within the corrective action process. The treatment of operability as a separate issue from the restoration of full qualification emphasizes that the operability determination process is focused on safe plant operation and should not be

[2] Exceptions to this general statement are possible, for example, in the case of a facility that is experiencing significant performance problems that have led to issuance of a confirmatory action letter or order preventing that licensee from continuing to operate or resuming operation until approval is granted by the NRC.

impacted by decisions or actions necessary to plan and implement corrective action (i.e., restore full qualification).

6.4 Enforcement Discretion

Under certain limited circumstances, a licensee may find that strict compliance with the TS or a license condition would cause an unnecessary action that is not in the best interest of public health and safety. NRC review and approval is required before a licensee may take action that is not in compliance with license conditions or TS, except in certain emergency situations when 10 CFR 50.54(x) and (y) can be applied. Guidance applicable to these limited circumstances is provided in NRC Inspection Manual, Part 9900: Technical Guidance, “Operations – Notices of Enforcement Discretion.”

7.0 CORRECTIVE ACTION

7.1 The Current Licensing Basis and 10 CFR 50, Appendix B

When licensing a plant, the NRC reviews the design information submitted by a license applicant to assure that the plant meets NRC rules and regulations (i.e., the licensing basis). The NRC issues a license authorizing the licensee to operate and maintain the plant in accordance with NRC rules and regulations, the conditions of the license, and plant TS. Licensee operation and maintenance of the plant in accordance with the license, and any changes to the license, ensures that the basis for NRC approval of the plant design remains valid.

The NRC has established various processes for making changes to the plant design in a controlled manner. Changes to the license and TS can be made as part of license amendments. Licensees may make changes to a facility in accordance with 10 CFR 50.59. In addition, for significant conditions adverse to quality, licensees are required by Criterion XVI of 10 CFR Part 50, Appendix B, to promptly identify and correct the conditions, and take action to prevent recurrence. When resolving degraded and nonconforming conditions as part of the corrective action, licensees may make changes to a facility in accordance with these processes.

The NRC has also established requirements for plant operation during maintenance within the CLB. For degraded or nonconforming conditions of SSCs described in TS, the license and TS normally specify the required actions to meet NRC requirements. For maintenance, 10 CFR 50.65 may also specify additional requirements for SSCs including risk assessments, enhanced monitoring, and repair and/or replacement activities. If a risk significant change would be encountered, a review of potential contingency plans for entering an increased risk profile should be completed as well as a review of ongoing and planned maintenance evolutions.

In addition, the NRC is kept informed of events and issues resulting from plant operations in part by establishing reporting requirements in the TS, 10 CFR 50.72, 50.73, 50.9(b), 10 CFR Part 21, or by other parts of the CFR.

Collectively, these requirements may be viewed as a process for licensees to continue to operate in accordance with their CLB, or to place the plant in a safe condition and take prompt corrective action. Both operability determinations and corrective actions for degraded and non-conforming conditions are intended to be consistent with the process.

7.2 Timing of Corrective Actions

The licensee should establish a schedule for performing corrective action when a SSC is determined to be degraded or nonconforming. For significant conditions adverse to quality, licensees should conduct a review in a timely manner to determine the extent of condition for all similarly affected SSCs. The NRC expects licensees to address any degraded or nonconforming condition in a time frame commensurate with the safety significance of the condition, even though 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," applies only to activities that affect the safety-related functions of SSCs.

In determining whether the licensee is making reasonable efforts to complete corrective actions promptly, the NRC will take into account safety significance, effects on operability, significance of degradation, and what is necessary to implement the corrective action. Factors that the NRC may consider are the amount of time required 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. If the licensee does not resolve the degraded or nonconforming condition at the first available opportunity or does not appropriately justify a longer completion schedule, the staff would conclude that corrective action has not been timely and would consider taking enforcement action. Factors that should be considered are: (1) the identified cause, including contributing factors and proposed corrective actions, (2) existing conditions and compensatory measures, 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.

7.3 Compensatory Measures

When evaluating the effect of a degraded or nonconforming condition on a SSC's ability to perform its specified safety function, a licensee may decide to implement compensatory measures as an interim action until final corrective action to resolve the condition is completed. Reliance on compensatory measures is an important consideration when establishing the time frame for completing corrective action.

Compensatory measures may be used to:

a. Maintain or enhance an operable but degraded or nonconforming SSC's capability to perform its specified safety functions, or they may become the next logical step in support of corrective maintenance or to compensate for the degraded or nonconforming condition. Compensatory measures for SSCs that have been determined to be degraded or nonconforming are usually implemented to restore plant operating margins.

b. Restore inoperable SSCs to an operable but degraded or nonconforming status. In general, these measures should have minimal operator or plant impact and should be relatively simple to implement.

The NRC expects that conditions requiring compensatory measures to restore SSC operability will be more quickly resolved than conditions that do not rely on compensatory measures. The reason is that reliance on compensatory measures to restore SSC operability suggests a greater degree of degradation or nonconformance. Similarly, the NRC expects that conditions requiring compensatory measures to restore operability, where the compensatory measure substitutes manual operator action in place of automatic action to perform a specified safety function, will be resolved expeditiously. Appendix C.5 of this manual chapter contains guidance on the temporary use of manual actions in place of automatic actions to support operability determinations.

The licensee should evaluate the technical acceptability and effectiveness of a compensatory measure as it relates to the degraded or nonconforming condition and the affected SSCs. The evaluation should also consider the effects of the compensatory measure on other aspects of the facility. In considering whether a compensatory measure could affect other aspects of the facility, a licensee should pay particular attention to ancillary aspects of the compensatory measure that could result from actions taken to compensate for the degraded condition. For example, a licensee may plan to close a valve as a compensatory measure to isolate a leak. Although that action would temporarily resolve the degraded condition, it could also affect flow distribution to other components or systems, complicate required operator responses to normal or off normal conditions, or have other effects that should be reviewed.

Additionally, if a compensatory measure involves a temporary facility or procedure change 10 CFR 50.59 should be applied. Licensees may use the guidance in NEI 96-07, Revision 1, "Guidelines for Implementing 10 CFR 50.59," which is endorsed by Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments."

7.4 Final Corrective Action

A licensee's range of corrective action may involve (1) full restoration to the UFSAR-described condition., (2) a change to the licensing basis to accept the as-found condition as is, or (3) some modification of the facility or CLB other than restoration to the condition as described in the UFSAR.

If corrective action is taken to restore the degraded or nonconforming condition, no 10 CFR 50.59 screening/evaluation is required. The 10 CFR 50.59 process applies when the final resolution of the degraded or nonconforming condition differs from the established UFSAR requirement. At this point, the licensee plans to make a change to the facility or procedures as described in the UFSAR. The proposed change is now subject to the review process established by 10 CFR 50.59. A change can be safe, but still require NRC approval. The proposed final resolution may require staff review and approval without affecting the continued operation of the plant, because interim operation is being governed by the processes for determining operability and taking corrective action (10 CFR 50 Appendix B).

In two situations, the identification of a final resolution or final corrective action triggers a 10 CFR 50.59 review, unless another regulation applies (e.g., 10 CFR 50.55a): (1) when a licensee decides as the final corrective action to change its facility or procedures to something other than full restoration to the UFSAR-described condition, and (2) when a licensee decides to change its licensing basis, as described in the UFSAR, to accept the degraded or nonconforming condition as its revised licensing basis. Each of these situations is discussed in greater detail below.

In both of these situations, the potential need to obtain NRC approval for a change does not affect the licensee's authority to operate the plant. The licensee may make mode changes, restart from outages, etc., with degraded or nonconforming conditions provided that operations with these conditions do not violate the TS or the license. The basis for this authority to continue to operate arises because the TS contain the specific characteristics and conditions of operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to public health and safety.

7.4.1 Change to Facility or Procedures in Lieu of Full Restoration

For this situation, the licensee's proposed final resolution of the degraded or nonconforming condition includes other changes to the facility or procedures to cope with the uncorrected or only partially corrected degraded or nonconforming condition. Rather than fully correcting the degraded or nonconforming condition, the licensee decides to restore capability or margin by making another change. In this case, the licensee must evaluate the change from the UFSAR described condition to the final condition in which the licensee proposes to operate its facility. If the 10 CFR 50.59 screening/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 requested, and the corrective action process is not complete until the approval is received or some other resolution occurs.

7.4.2 Change to the Current Licensing Basis to Accept an As-found Condition

In the other situation the licensee proposes to change the current licensing basis to accept the as-found nonconforming condition. In this case, the 10 CFR 50.59 review covers the change from the UFSAR-described condition to the existing condition in which the licensee plans to remain (i.e., the licensee will exit the corrective action process by revising its licensing basis to document acceptance of the condition). If the 10 CFR 50.59 screening/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 requested and the corrective action process is not complete until the approval is received or some other resolution occurs. To resolve the degraded or nonconforming condition without restoring the affected SSC to its CLB, a licensee may need to obtain 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. The use of 10 CFR 50.59, 50.12, or 50.55a does not relieve the licensee of the responsibility to comply with 10 CFR 50, Appendix B, Criterion XVI, “Corrective Action” for significant conditions adverse to quality to determine the cause, to examine other affected systems, to take action to prevent recurrence, and to report the original condition, as appropriate.

Appendix A
SURVEILLANCES

A.1 Operability During TS Surveillances

If performance of TS surveillances requires that SSCs required to be operable by the TS be rendered incapable of performing their specified safety function, the SSCs are inoperable. The LCO must immediately be declared not met. Upon completion of the surveillance, the licensee should verify restoration to operable status of at least those portions of the SSCs or system features that were altered to accomplish the surveillance.

Technical specifications permit use of TS action statements to perform surveillance testing for a number of reasons. One reason is that the time needed to perform most surveillance tests is usually only a small fraction of the completion time associated with the required action. Another reason is that the benefits to safety (increased level of assurance of reliability and verification of operability) derived from meeting surveillance requirements is considered to more than compensate for the risk to safety from operating the facility when a TS LCO is not met.

A.2 System Configuration During Surveillance and Operability Testing

It is preferable that TS surveillance requirements be performed in a configuration and in conditions representative of those in which the system must perform its specified safety function. However, testing in other configurations or conditions may be required if testing in the SSF configuration would result in unwarranted safety concerns or transients. In this case, the surveillance requirement acceptance criteria in the TS for the test condition should be based on an extrapolation from the test condition to the condition in which the specified safety function is performed. Operability is based on meeting the acceptance criteria specified in the TS. The system configuration for TS surveillance requirements is usually prescribed, and the acceptance criteria are established on that basis.

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 root cause or correction of any problem in a previous test is not acceptable as a means to establish or verify operability and may constitute preconditioning.

A.3 Missed Technical Specification Surveillance

When a TS surveillance is missed, the TS shall be followed, for most plants STS SR 3.0.3, or the equivalent, applies. NRC Generic Letter 87-09, “Sections 3.0 and 4.0 of the Standard Technical Specifications (STS) of the Applicability of Limiting Conditions for Operation and Surveillance Requirements,” dated June 4, 1987, contained a TS allowance which provided time to perform a missed surveillance . If a missed surveillance cannot be performed within any time allowance provided by TS or the surveillance is not met when it is performed, the associated LCO is considered not met.

Appendix B
MAINTENANCE

B.1 Assessment and Management of Risk during Maintenance

After discovering a degraded or nonconforming condition, a licensee will typically perform corrective maintenance to restore a SSC to meet all aspects of its CLB. The TS and/or risk assessment should be used to determine the appropriate time frame to complete the maintenance or take other action. The Maintenance Rule, 10 CFR 50.65, provides requirements for monitoring the effectiveness of maintenance at nuclear power plants. The underlying objective is to help maintain plant safety by trending the performance and condition of SSCs within the scope of the rule in terms of reliability and availability to predict their future performance and condition and to assess the effectiveness of maintenance. Specifically, 10 CFR 50.65(a)(3) requires that licensees ensure that the objective of preventing failures of SSCs through maintenance, (i.e., reliability), is appropriately balanced against the objective of maximizing availability of SSCs due to monitoring or preventive maintenance. Additionally, 10 CFR 50.65(a)(4) requires that licensees perform risk assessments before maintenance activities involving SSCs within the scope of paragraph (a)(4) and manage the increase in overall plant risk that may result.

The risk assessment performed by the licensee per 10 CFR 50.65(a)(4) should reflect the unavailability of the affected SSCs during the performance of maintenance. In addition, the assessment should also consider the unavailability of any degraded or nonconforming SSCs determined to be inoperable or nonfunctional. Performing the 10 CFR 50.65(a)(4) risk assessment, however, does not relieve the licensee from compliance with its license (including TS) and other applicable regulations.

The conduct of maintenance may also involve compensatory measures to allow the maintenance to be performed and/or to reduce risk. Compensatory measures associated with maintenance should be assessed consistent with NUMARC 93-01, Section 11 as endorsed by NRC regulatory guides . Certain compensatory measures may involve temporary procedure or facility alterations to allow the maintenance to be performed or to reduce risk. Such alterations include but are not limited to jumpered terminals, lifted leads, and temporary blocks, bypasses, or scaffolding. Temporary alterations associated with maintenance should be reviewed under 10CFR50.59, as applicable, consistent with NEI 96-07 which is endorsed by NRC Regulatory Guide 1.187.

The planned removal of hazard barriers for maintenance is considered a temporary facility alteration. Additional guidance on hazard barriers is provided in Regulatory Issue Summary (RIS) 2001-009, “Control of Hazard Barriers,” dated April, 2, 2001. In all cases, licensees must continue to comply with the plant TS particularly the operability provisions applicable to the protected SSCs. RIS 2001-09 stipulates that the operability guidance in the NRC Inspection Manual can be used to evaluate the operability of protected equipment.

B.2 Operability during Maintenance

During maintenance (preventive, predictive, or corrective), SSCs may be removed from service and rendered incapable of performing their function(s). For SSCs described in TS, such SSCs are clearly inoperable. The maintenance activity and any TS-required actions are expected to be finished within the completion times. A licensee may take SSCs out of service to perform maintenance during power operation of the plant, but they must meet the requirements of 10 CFR 50.65 in addition to (and not as a substitute for) the TS. This is true for maintenance activities under all modes of plant operation. The licensee also may need to reestablish operability for systems or components that are rendered inoperable by SSCs undergoing maintenance.

B.3 Relationship between Operable and Available

Operability is a term that is defined in Section 1.1 of the Standard Technical Specifications. Both the maintenance rule and the performance indicator process utilize the term "availability" relative to the function(s) being monitored by the rule/process. The difference between "operability" and "availability" lies in the description of the function being reviewed; to understand these differences the inspector should review supporting documents for to the rule/process. Available references include Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants."

B.4 Reduced Reliability as a Degraded or Nonconforming Condition

Reliability is a measure of the reasonable expectation of the ability of an SSC to perform its specified function(s). The reliability is generally based on design verification, quality assurance, production testing and acceptance processes initially, but in service, reliability is based on operating experience, i.e., the consistency with which the SSC successfully performs its specified function(s) on demand. Hence reliability is often expressed in terms of numbers of successes for a given number of demands.

When an SSC experiences multiple failures, and especially repetitive failures (i.e., those of the same or similar cause), such as those addressed in licensees' Maintenance Rule programs, or the failures exceed the number of expected failures based on relevant operating experience, then the reliability of the affected SSC would be expected to be considered reduced.

An SSC that has been identified to have a reduced reliability should be evaluated to determine whether the nature or extent of the reduced reliability constitutes a degraded or nonconforming condition. If it is determined that the reduced reliability of an SSC described in TS constitutes a degraded or conforming condition, then the affected SSC should be evaluated for operabillity when and as described in this document. Non-TS SSCs with reduced reliability should be similarly treated as described in this document. When SSC capability or reliability is degraded to the point of where there is no longer a reasonable expectation that it can perform its specified safety functions, the SSC should be judged inoperable, even if at this instantaneous point in time the system could provide the specified function. A reliability reduction that calls into question the ability of an SSC to perform its specified safety function should also trigger an operability determination.

Note that various factors may contribute to reduced reliability, but aging of SSCs is a factor of increasing importance and it should be addressed as discussed in Section 4.0 of this document.

Note also that reduced reliability may affect the validity of underlying assumptions in one or more of the programs that use reliability information. Most notably, the plant's PRA contains assumed or default values for SSC failure rates, another expression of reliability, in its fault-tree analysis. Therefore, significant or persistent changes in the reliability of SSCs modeled in the PRA may need to be evaluated to determine the need to update the PRA and its derivatives, such as risk assessment tools, in order for them to reflect the actual risk environment.

Appendix C
SPECIFIC OPERABILITY ISSUES

C.1 Relationship between the General Design Criteria and the Technical Specifications

The General Design Criteria (GDC) and the TS differ in that the GDC specify requirements for the design of nuclear power reactors, whereas the TS specify requirements for the operation of nuclear reactors. This section provides a general context for the relationship between GDC and TS. Some facilities were licensed prior to codification of the GDC in 10 CFR, and as a result applicability of the GDC varies among facilities. In all cases, the plant-specific current licensing basis is governing.

The criteria in the GDC correspond both directly and indirectly to the operational requirements in the TS. The GDC "establish the necessary design, fabrication, construction, testing, and performance requirements for SSCs important to safety." Thus, the GDC cover a broad spectrum of SSCs, not all of which are described subject to the TS. The GDC are reflected in the facility design as described in the UFSAR. The licensee derives the TS from the facility design requirements and from analyses that support the facility design as described in the UFSAR and NRC evaluations of those analyses.

While a variety of features must be included in the design of a nuclear power reactor, the TS need control only those aspects of the design and plant conditions required to satisfy 10 CFR 50.36. As stated in 10 CFR 50.36, TS are to be "derived from the analyses and evaluations included in the safety analysis report." The TS establish, among other things, limiting conditions for operation which are "the lowest functional capability or performance levels of SSCs required for safe operation of the facility."

Required actions and completion times of the TS illustrate the relationship between the GDC and the TS. The GDC require redundancy of function for safety systems. This is normally accomplished by incorporating at least two redundant trains into the design of each safety system. The TS typically allow a facility to continue to operate for a specified time with only one train of a two-train safety system operable. In such a case, the GDC are met because the system design provides the necessary redundancy. The TS permits the operation of the system with only a single train based on an evaluation of the protection provided by the unique system lineup for the specified period.

Failure to meet a GDC in the CLB should be treated as a degraded or nonconforming condition. As with any degraded or nonconforming condition, the technical guidance in this document should be followed.

C.1.1 Single Failures

10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," defines a single failure as follows:

> "A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure."

Appendix A contains general design criteria (GDC) for SSCs that perform major safety functions. Many of the GDC contain a statement similar to the following:

> "Suitable redundancy in components and features and suitable interconnections, leak detection, isolation and containment capabilities shall be provided to assure that for onsite electrical power system operation (assuming offsite power is not available) and for offsite electrical power system operation (assuming onsite power is not available) the system safety function can be accomplished assuming a single failure."

See, for example, GDC 17, 34, 35, 38, 41, and 44. Therefore, capability to withstand a single failure in fluid or electrical systems is a plant-specific design consideration, which ensures that a single failure does not result in a loss of the capability of the system to perform its safety function(s).

A design deficiency in which the capability to withstand a single failure is compromised should be treated as a degraded and nonconforming condition. As with any degraded or nonconforming condition, the technical guidance in this document should be followed.

C.2 Treatment of Consequential Failures in Operability Determinations

A consequential failure is a failure of a SSC caused by a postulated accident within the design basis. For example, if a broken pipe could whip and incapacitate a nearby pump during a loss-of-coolant accident (a design basis event), then the pump would not be able to function. Such a pump failure is called a consequential failure because the pump would have failed as a result of the design basis event itself. In general, facility design takes into consideration any consequential failures that are deemed credible. In this case, that would mean that the broken pump could not be credited in the safety analysis for LOCA mitigation.

When a SSC is found to be degraded or nonconforming, the operability determination should assess credible consequential failures previously considered in the design (i.e., the SSC failures that would be a direct consequence of a design basis event) for which the degraded or nonconforming SSC needs to function. Where consequential failures (i.e., considering the degraded or nonconforming condition) would cause the loss of specified safety function(s) needed for limiting or mitigating the effects of the event, the affected SSC is inoperable because it cannot perform all of its specified safety functions. Such situations are most likely discovered during design basis reconstitution studies, or when new credible failure modes are identified.

C.3 Use of Alternative Analytical Methods in Operability Determinations

When performing operability determinations, licensees sometimes use analytical methods or computer codes different from those originally used in the calculations supporting the plant design. This practice is part of 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 they form part of the final corrective action. 10 CFR 50.59 would be applicable upon implementation of corrective action.

Although the use of alternative and normally more recent methods or computer codes may raise complex plant-specific issues, their use may be useful and acceptable in operability determinations. Therefore, the inspector should consult with the region and NRR when reviewing such a determination. The use of alternative methods should generally be handled as follows:

a. While not commonly encountered, a regulation or license condition may specify the name of the analytic method for a particular 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 the Technical Specifications. In this example, an evaluation of an SSC's performance capability may be determined with a non-COLR method, but the limits contained within the COLR must continue to comply with the Technical Specification.

b. The use of any analytical method must be technically appropriate to characterize the SSCs involved, the nature of the Degraded or Non-Conforming Condition, and specific facility design. General considerations for establishing this adequacy include:

    (1) If the analytic method in question is described in the CLB, the licensee should evaluate the situation-specific application of this method. This includes consideration of the differences between the CLB-described analyses and the proposed application in support of the ODP.

    (2) Simply 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 consist with the applicable acceptance criteria in the CLB. For example, if the current performance levels are expressed in terms of Rem, then the method can not generate results expressed in TEDE.

    (4) If the analytic method is not currently described in the CLB, then the models employed must be capable of properly characterizing the SSC's performance. This includes modeling of the effect of the degraded or non-conforming condition.

    (5) Acceptable alternative methods include the use of "best estimate" codes, methods, and techniques. In these cases, the evaluation should ensure that the SSC's performance is not over-predicted.

    (6) The use of the software should be controlled in accordance with the licensee's Quality Assurance Program, as applicable. This includes the availability of qualified reviewers and the ability to verify results.

C.4 Use of Temporary Manual Action in Place of Automatic Action in Support of Operability

Automatic action is frequently provided as a design feature specific to each SSC to ensure that specified safety functions will be accomplished. Limiting safety system settings (LSSS) for nuclear reactors are defined in 10 CFR Part 50.36, "Technical Specifications," as settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. Accordingly, it is not appropriate to take credit for manual action in place of automatic action for protection of safety limits to consider SSCs operable. This does not preclude operator action to put the plant in a safe condition, but operator action cannot be a substitute for automatic safety limit protection.

Credit for manual initiation of a specified safety function should be established as part of the licensing review of a facility. Although the licensing of specific facility designs includes consideration of automatic and manual action in the performance of specified safety functions, not every combination of circumstances has been reviewed from an operability standpoint.

For situations where substitution of manual action for automatic action is proposed as part of an operability determination, the use of manual action must focus on the physical differences between automatic and manual action and the ability of the manual action to accomplish the specified safety function(s). The physical differences to be considered include, but are not limited to, 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 manning requirements, and emergency operating procedures written for the automatic mode of operation. The licensee should have written procedures in place and training accomplished on those procedures before substitution of any manual action for the loss of an automatic action.

The assignment of a dedicated operator for manual action requires written procedures and full consideration of all pertinent differences. The consideration of manual action in remote areas must include the ability and time necessary to reach the area, training of personnel to accomplish the task, and occupational hazards to be incurred such as radiation, temperature, chemical, sound, or visibility hazards. One reasonable test of the reliability and effectiveness of manual action may be the approval of manual action for the same function at a similar facility. Nevertheless, this is expected to be a temporary condition until the automatic action can be promptly corrected in accordance with 10 CFR Pat 50 Appendix B and the licensee’s corrective action program.

C.5 Use of Probabilistic Risk Assessment in Operability Decisions

Probabilistic risk assessment (PRA) is a valuable tool for evaluating accident scenarios because it can consider, among other things, the probabilities of occurrence of accidents or external events. Nevertheless, the definition of operability states that the SSC must be capable of performing its specified safety function(s), which inherently assumes that the event occurs and that the safety function can be performed. Therefore, the use of PRA, or probabilities of occurrence of accidents or external events, is not acceptable for making operability decisions.

However, PRA may provide valid and useful supportive information for timeliness of an operability decision and timeliness of a corrective action for a license amendment. PRA is also useful for determining the safety significance of SSCs. The safety significance, whether determined by PRA or other analyses, is a factor in making decisions about the appropriate timeliness of operability determinations.

C.6 Environmental Qualification

When a licensee identifies a degraded or nonconforming condition that affects compliance with 10CFR50.49,[3] (i.e., a licensee does not have an adequate basis to establish qualification), the licensee is expected to apply the guidance of this manual chapter. The licensee may use the criteria of Section 4.4 to establish a reasonable expectation that SSCs will perform specified function(s). In this connection, it must also be shown that subsequent failure of the equipment, if likely under accident conditions, will not result in in a consequential failure as discussed in Section C.2.

C.7 Technical Specification Operability vs. ASME Code Criteria

The TS normally apply to the overall performance of plant systems, but sometimes contain limiting values for the performance of certain components. The limiting values are specified to ensure that the design basis and safety analysis are satisfied. The values (e.g., pump flow rate, valve closure time, valve leakage rate, safety/relief valve set point pressure) are criteria that can be used to verify operability. If the values are not met at any time, the system must be declared inoperable, the LCO must be declared not met, and the applicable Condition(s) must be entered.

ASME Code acceptance criteria for inservice inspection (ISI) and 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 code as component performance parameters, may be more limiting than the TS values (which are accident analysis limits). Position 8 in Attachment 1 to Generic Letter 89-04 (Guidance on Developing Acceptable Inservice Testing Programs) defines the starting point for the completion time in TS Actions for ASME pumps-and-valve testing. When performance data fall outside the required action range, regardless of whether the limit is equal to the TS limit or more restrictive, the pump or valve must be declared inoperable immediately (the term "inoperative" is used in the text of the ASME Code, i.e., the pump or valve is both "inoperative" and inoperable) and the Limiting Condition for Operation (LCO) must be declared not met and the applicable Condition(s) must be entered.

[3] 10 CFR 50.49, “Environmental qualification of electric equipment important to safety for nuclear power plants.”

When the required action range is more limiting than its corresponding TS, the corrective action does not have to be limited to replacement or repair; it could be an analysis to demonstrate that the specific performance degradation does not impair operability and that the pump or valve will still fulfill its function, such as delivering the required flow. A new required action range may be established after such analysis which would then allow for a new determination of operability.

The durations specified by the ASME Code for analyzing test results have not been accepted by the NRC for postponing entry into a TS action statement. As soon as data are recognized as being within the required action range for pumps or as exceeding the limiting value of full-stroke time for valves, the associated component must be declared inoperable and, if subject to the TS, the completion time specified in the action statement must be started at the time the component was declared inoperable. For inoperable pumps and valves that are part of an ASME ISI program but not subject to specific TS, the action shall be consistent with the safety significance of the issue and the functions served by the affected system(s).

Recalibrating test instruments and then repeating pump or valve tests is an acceptable alternative to repair or replacement, but is not an action that can be taken before declaring the pump or valve inoperable. However, if during a test it is obvious that a test instrument is malfunctioning, the test may be halted and the instruments promptly recalibrated or replaced. During a valid test, anomalous data with no clear indication of the cause must be attributed to the pump or valve under test. For this occurrence, a prompt determination of operability is appropriate with follow-on corrective action as necessary.

Note: In the above discussion, "required action range" and "inoperative" are ASME Section XI terms.

C.8 Support System Operability

The definition of operability embodies the principle that a SSC described in TS can perform its specified safety function(s) only when all necessary support systems are capable of performing their related support functions. It is incumbent upon each licensee to understand which support systems are necessary to ensure operability of supported TS systems.

There are cases where judgment on the part of the licensee is appropriate 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(s). For example, a ventilation system may be required in the summer to ensure that SSCs 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 SSCs can perform their specified safety function(s), but may not be required in the summer. In all such cases, the licensee should periodically review the basis for determining that a support system is not required to ensure (a) the conclusion remains valid, and (b) there is timely restoration of the support system (which may be accomplished as part of the corrective action program). As an alternative to restoration, the licensee may modify the support function as it would make 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. This verification ensures that the facility has not lost the complete capability to perform the specified safety function. The term "verify" as used here, allows for 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. In all cases, a licensee's plant-specific TS are governing.

C.9 Piping and Pipe Support Requirements

Piping and pipe supports found to be degraded or nonconforming and that support SSCs described in TS should be subject to an operability determination. To assist licensees in the determination, the following criteria are provided to address various components. These components include the piping, supports, support plates, and anchor bolts. IE Bulletin 79-14 (Seismic Analyses for As-Built Safety-Related Piping Systems), including Supplements 1 and 2, provide additional guidance.

Specific operability criteria for concrete anchor bolts and pipe supports are addressed in IE Bulletin 79-02, Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts (see Revision 1, Supplement 1, and Revision 2). The criteria for evaluating the operability of seismic design piping supports and anchor bolts relating to Bulletins 79-02 and 79-14 (Seismic Analyses for As-Built Safety-Related Piping Systems) are described in internal NRC memos dates July 16, 1979 (ADAMS Accession Number ML993430206), and August 7, 1979 (NUDOCS Accession Number 9010180274). When a degradation or nonconformance associated with piping or pipe supports is discovered, the licensee should use the criteria in Appendix F of Section III of the ASME Code for operability determinations. The licensee should continue to use these criteria until CLB criteria can be satisfied (normally the next refueling outage).

SSCs that do not meet the above criteria, but are otherwise determined to be operable, should be treated as inoperable until NRC approval is obtained for any additional criteria or evaluation methods used to determine operability. Where a piping support is determined to be inoperable, the licensee should determine the operability of the associated piping system.

C.10 Flaw Evaluation

10 CFR 50.55a(g) requires that structural integrity be maintained in conformance with ASME Section XI (Code) for those parts of a system that are subject to Code requirements. The Code contains rules describing acceptable means of inspecting welds in piping, vessels, and areas of high stress concentration. The Code also specifies acceptable flaw sizes based on the material type, location and service of the system within which the flaw

is discovered. If the flaw exceeds these generally acceptable limits, the Code also describes an alternate method by which a refined calculation may be performed to evaluate the acceptability of the flaw. At no time does the Code allow an unrepaired through-wall flaw to be returned to service. If a flaw is discovered by any means (including surveillance, maintenance activity, or inservice inspection) in a system subject to Code requirements (whether during normal plant operation, plant transition, or shutdown operation) the flaw must be promptly evaluated using Code rules. If the flaw is through-wall or does not meet the limits established by the Code, that component and portion of the system containing the flaw is inoperable. If the flaw is within the limits established by the Code, that component and portion of the system is operable. Evidence of leakage from the pressure boundary indicates the presence of a through-wall flaw. It may be possible to use visual methods to determine the exterior dimension(s) and orientation of a through-wall flaw in a leaking component. Even if the outside surface breaking dimension of a through-wall flaw is small, the length and extent of the flaw inside the component wall may be quite long and potentially outside the limits established by the Code. This is the reason the component is declared inoperable while the actual geometry of the through-wall flaw is being characterized by methods such as ultrasonic examination and a flaw evaluation is being performed. However, flaw evaluation should be used to determine how long the flawed component is operable before the flaw grows to exceed Code limits.

Generic Letter 90-05, “Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping” and Code Case –513, “Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping, Section XI, Division 1" describe acceptable alternate means for evaluating and accepting flaws in moderate energy piping. Generic Letter 90-05 describes a method by which a flaw, not acceptable under the Code, may be returned to service without prior NRC approval. It also describes an acceptable method for obtaining NRC relief from Code requirements under 10 CFR 50.55a. Because an evaluation and acceptance of a flaw, using the guidance in GL 90-05, is not in conformance with the requirements of the Code, it must be reported to the NRC as stated in GL 90-05. If a flaw meets the guidance of GL 90-05, the system containing the flaw is operable.

Code Cases that describe methods, criteria, or requirements different from the Code referenced in 10 CFR 50.55a cannot be used without prior NRC review and approval unless they have been endorsed in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." Code Case –513, which describes an acceptable alternative to the methods described in the Code for the acceptance of a flaw in a Class 3 moderate energy piping system, has been endorsed in RG 1.147. A flaw that is evaluated in accordance with, and meets the acceptance criteria of, Code Case –513 is acceptable to both the ASME Code and the NRC. If the flaw does not satisfy the requirements of Code Case –513, the system containing the flaw is inoperable.

Code Case –513 has been accepted by the NRC for application in the licensee's inservice inspection programs, with the following conditions:

a Specific safety factors in paragraph 4.0 of –513 must be satisfied, and
b. Code Case –513 may not be applied to:
   (1) Components other than pipe and tubing

(2) Leakage through a gasket
(3) Threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is not a structural flaw; thread integrity must be maintained).
(4) Degraded socket welds.

If a flaw exceeds the thresholds of the ASME Code, Generic Letter 90-05, Code Case –513, or any other applicable NRC-approved Code Case, the system containing the flaw is inoperable until the NRC approves an alternative analysis, evaluation, or calculation to justify the flaw's return to service and the subsequent operability of the system. Prior to receiving the NRC's approval for the alternative analysis, evaluation, or calculation, the inoperable system is subject to the applicable TS LCO.

Flaws in Class 2 or 3 moderate energy piping may also be evaluated using the criteria of Code Case –513-1 "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1." The same limitations imposed by the NRC staff on Code Case –513 apply to Code Case –513-1. Code Case –513-1 has been reviewed and found acceptable by the NRC. However, the approval of Code Case –513-1 has not yet been incorporated into RG 1.147 or the Code of Federal Regulations for generic use. Therefore, until Code Case –513-1 is approved for generic use in either RG 1.147 or 10 CFR 50.55a, the licensee would need to request relief and obtain NRC approval to use Code Case –513-1. As with Code Case –513, if the flaw does not satisfy the requirements of Code Case –513-1, the system containing the flaw is inoperable.

C.11 Operational Leakage from Code Class 1, 2, and 3 Components

Leakage from the reactor coolant system, as specified in TS, is limited to specified values in the TS depending on whether the leakage is from identified, unidentified, or specified sources such as the steam generator tubes or reactor coolant system pressure isolation valves. If the leakage exceeds TS limits, the Limiting Condition for Operation (LCO) must be declared not met and the applicable conditions must be entered. For identified leakage attributed to the reactor coolant system that is within the limits of the TS, the licensee should determine operability for the degraded component and include in the determination the effects of the leakage on other components and materials.

Existing regulations and TS require that the structural integrity of ASME Code Class 1, 2, and 3 components be maintained in accordance with the ASME Code. In some cases regarding specific types of degradation, other regulatory requirements must also be met. If a leak is discovered in a Class 1, 2, or 3 component in the conduct of an inservice inspection, maintenance activity, or facility operation, corrective measures may require repair/replacement activities in accordance with IWA-4000 of Section XI. In addition, the leaking component should be evaluated for flaws according to IWB-3000, which addresses the analytical evaluation and acceptability criteria for flaws.

The TS do not permit any reactor coolant pressure boundary (RCPB) leakage. The Operational Leakage LCO must be declared not met when pressure boundary leakage is occurring. Upon discovery of leakage from a Class 1, 2 or 3 pressure boundary component (i.e., pipe wall, valve body, pump casing, etc.), the licensee must declare the component inoperable. Evidence of leakage from the pressure boundary indicates the presence of a through-wall flaw. It may be possible to use visual methods to determine the exterior dimension(s) and orientation of a through-wall flaw in a leaking component. Even if the outside surface breaking dimension of a through-wall flaw is small, the length and extent of the flaw inside the component wall may be quite long and potentially outside the limits established by the Code. This is the reason the component is declared inoperable while the actual geometry of the through-wall flaw is being characterized by methods such as ultrasonic examination and a flaw evaluation is being performed. However, following the declaration of inoperability for leakage from Class 3 moderate energy piping, the licensee may evaluate the structural integrity of the piping by fully characterizing the extent of the flaw using volumetric methods and evaluating it using the criteria of Paragraph C.3.a of Enclosure 1 to GL 90-05. If the flaw meets the criteria the piping can subsequently be deemed operable but degraded until relief from the applicable Code requirement(s) is obtained from the NRC. As an alternative, the licensee can evaluate the structural integrity of leaking Class 3 moderate energy piping using the criteria of Code Case –513, "Evaluation Criteria for Temporary Acceptance of Flaws in Class 3 Piping Section XI, Division 1," which is approved with limitations imposed by the NRC staff and incorporated by reference in 10 CFR 50.55(a)(b)(2)(xiii). The limitations imposed by the NRC staff are as follows:

a. Specific safety factors in paragraph 4.0 of –513 must be satisfied, and
b. Code Case –513 may not be applied to:
   (1) Components other than pipe and tubing
   (2) Leakage through a gasket
   (3) Threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is not a structural flaw; thread integrity must be maintained).
   (4) Degraded socket welds.

Following the declaration of inoperability, the licensee may also decide to evaluate the structural integrity of leaking Class 2 or 3 moderate energy piping using the criteria of Code Case –513-1 "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1." The same limitations imposed by the NRC staff on Code Case –513 apply to Code Case –513-1. Code Case –513-1 has been reviewed and found acceptable by the NRC. However, the approval of Code Case –513-1 has not yet been incorporated into RG 1.147 or the Code of Federal Regulations for generic use. Therefore, until Code Case –513-1 is approved for generic use in either RG 1.147 or 10 CFR 50.55a, the licensee would need to request relief and obtain NRC approval to use Code Case –513-1.

If the piping meets the criteria of ASME Code Case –513, continued temporary service of the degraded piping components is permitted. If the licensee decides to control the leakage by mechanical clamping means, the requirements of Code Case –523-2, "Mechanical Clamping Devices for Class 2 and 3 Piping Section XI, Division 1," may be followed, as referenced in 10 CFR 50.55a(b)(2)(xiii). It should be noted that this Code Case is to maintain the structural integrity of Class 2 and 3 piping, NPS 6 and smaller and shall not be used on piping larger than NPS 2 when the nominal operating temperature or pressure exceeds 200EF or 275 psig. These and other applicable Code Cases which have been determined by the NRC to be acceptable to be used by the licensee without a request or authorization from the NRC are listed in RG 1.147. These Code Cases do not apply to Class 1 pressure boundary components.

For Class 2 heat exchanger tubing leakage, the licensee can evaluate its structural integrity using the criteria of ASME Code Class –513-1 "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1." Currently, Code Case –513-1 has been reviewed and found acceptable by the NRC but its approval has not yet been incorporated into RG 1.147 or the Code of Federal Regulations. The same limitations imposed by the NRC on Code Case –513 apply to Code Case –513-1. Therefore, until Code Case –513-1 is approved for generic use in either RG 1.147 or 10 CFR 50.55a, the licensee would need to request relief and obtain NRC approval to use Code Case –513-1. If the tubing meets the criteria of ASME Code Case –513-1, continued temporary service of the degraded component is permitted.

The NRC has no specific guidance or generically approved alternatives for temporary repair of flaws (through-wall or non-through-wall) Class 1, 2 or 3 high energy system components, or for Class 2 or 3 moderate energy system pressure boundary components other than piping. Therefore, all such flaws in these components must be repaired in accordance with Code requirements, or relief from Code requirements must be requested and approval obtained, from the NRC.

C.12 Structural Requirements

Structures may be required to be operable by the TS, or they may be required support systems for SSCs in the TS. Degradation affecting structures includes concrete cracking and spalling, excessive deflection or deformation, water leakage, rebar corrosion, missing or bent anchor bolts, degradation of door and penetration sealing, etc.. If a structure is degraded, it should be assessed to determine its capability to perform it SF. As long as the identified degradation does not result in exceeding acceptance limits specified in applicable design codes and standards, referenced in the design basis documents, the affected structure is either operable or functional.

NRC inspectors, with possible support by headquarters, should review licensees' evaluations of structural degradations to determine their technical adequacy and conformance to licensing and regulatory requirements.

ATTACHMENT 1

Operability Determination and Functionality Assessment Flowchart

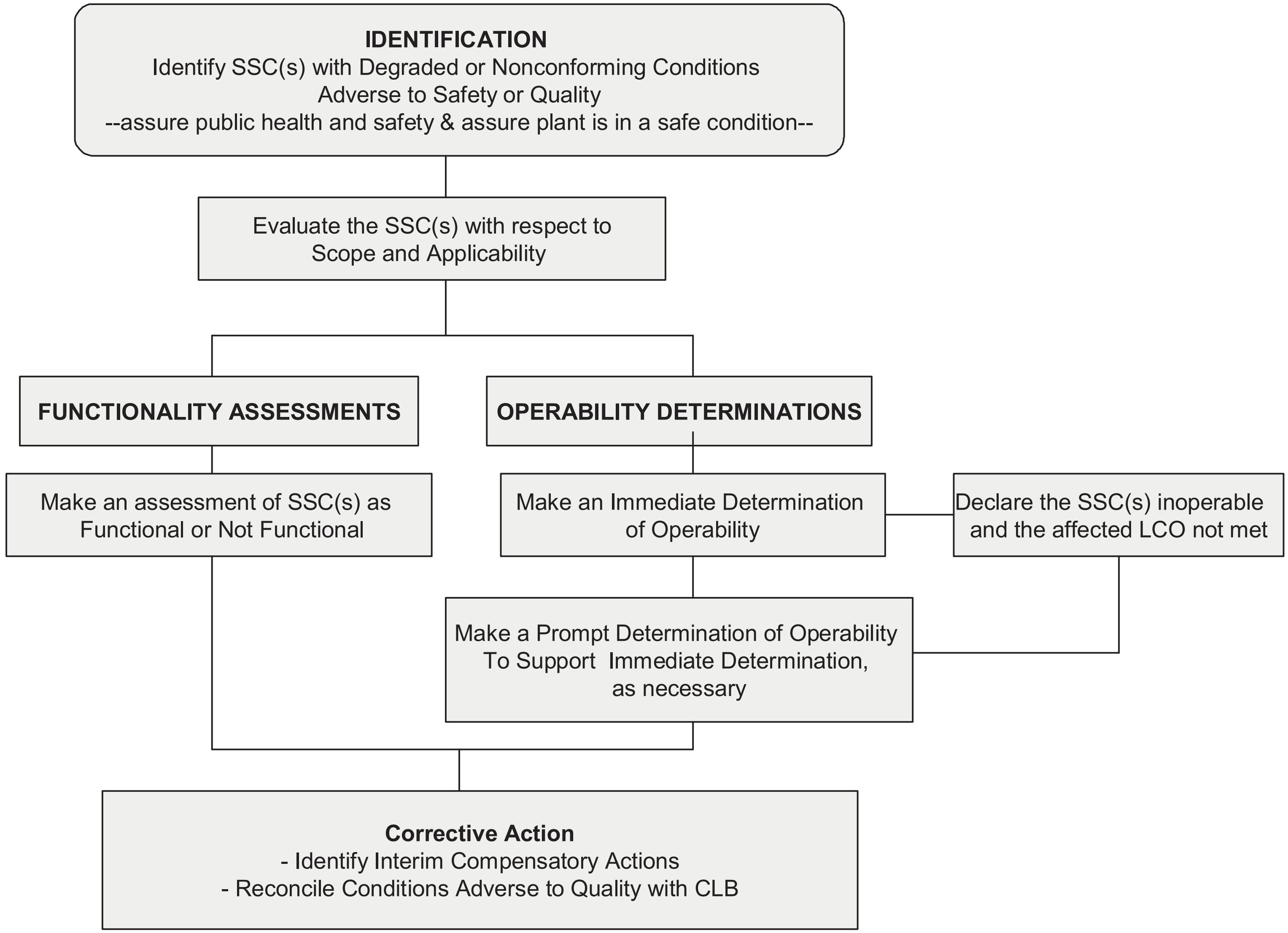

TABLE 1

SSC QUALIFICATION AND OPERABILITY STATUS
WHEN DEGRADED OR NONCONFORMING CONDITIONS
ARE IDENTIFIED AND EVALUATED

SSC(s) CONDITION	QUALIFICATION STATUS OF SSC(s)	SSC(s) STATED IN FACILITY TS
No existing Condition(s)	Fully Qualified	Operable
One or more Condition(s) exist affecting SSF(s) or margin in CLB, but SSC determined able to perform SSF(s)	Not Fully Qualified	Operable but Degraded or Nonconforming
One or more Condition(s) exist affecting SSF(s), and SSC determined not able to perform SSF(s)	Not Fully Qualified	Inoperable
One or more Condition(s) exist affecting SF(s), and SSC determined not able to perform SF(s)	Not Fully Qualified	Not Applicable