NRC INSPECTION MANUAL

STSB

MANUAL CHAPTER 0326

OPERABILITY DETERMINATIONS & FUNCTIONALITY ASSESSMENTS FOR CONDITIONS ADVERSE TO QUALITY OR SAFETY

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0326-01 PURPOSE

This guidance is provided to NRC inspectors to assist their review of licensee determinations of operability and resolution of degraded or nonconforming conditions. In addition, many licensees have found this guidance useful in developing their plant-specific operability determination process. 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 (TSs), 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 concern should be safe operation of the plant. When a degraded or nonconforming condition is identified that may pose a 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. The TSs require that an SSC be operable given the plant condition (operational mode); thus there should be a reasonable expectation that the SSC in question is operable while an operability determination is being made, or an appropriate TS action requirement should be entered.

0326-02 SCOPE AND APPLICABILITY

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

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

The operability determination process is used to assess operability of SSCs described in TSs. The scope of SSCs considered within the operability determination process is as follows:

a. SSCs required to be operable by TSs. These SSCs may perform required support functions for other SSCs required to be operable by TSs (e.g., emergency diesel generators and service water).

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

02.02 Scope of SSCs for Functionality Assessments

Functionality assessments should be performed for SSCs not described in TSs, but which warrant programmatic controls to ensure that SSC availability and reliability are maintained. In general, these SSCs and the related controls are included in programs related to Appendix B to 10 CFR Part 50, "Quality Standards and Records," and the maintenance rule (10 CFR 50.65). Additionally, SSCs warrant functionality assessments within the processes used to address degraded and nonconforming conditions because they perform ~~specified~~ safety functions described in the Updated Final Safety Analysis Report (UFSAR), technical requirements manual, emergency plan, fire protection plan, regulatory commitments, or other elements of the current licensing basis (CLB).

0326-03 DEFINED TERMS

03.01 Current Licensing Basis: The CLB 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 CLB include:

a. 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.
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, Licensee Event Reports, generic letters, and enforcement actions).
h. Licensee commitments documented in NRC safety evaluations.

03.02 Degraded Condition: A degraded condition is one in which the qualification of an SSC or its functional capability is reduced. Examples of degraded conditions are failures, malfunctions, deficiencies, deviations, and defective material and equipment. Examples of conditions that can reduce the capability of a system are aging, erosion, corrosion, improper operation, and maintenance.

03.03 Design Bases: Design bases information, defined by 10 CFR 50.2,[1] is documented in the UFSAR as required by 10 CFR 50.71. The design basis of safety-related SSCs is established initially during the original plant licensing and relates primarily to the accident prevention or mitigation functions of safety-related SSCs. The design basis of a safety-related SSC is a subset of the CLB.

[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."

03.04 Fully Qualified[2]: An SSC is 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. An SSC is considered "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 TS require to be operable 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 result in immediate failure to meet a specified safety 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. Loss of conservatism that is not credited in the CLB does not affect operability or functionality.

03.05 Functional/Functionality: Functionality is an attribute of SSCs that is not controlled by TSs. An SSC is functional or has functionality when it is capable of performing its ~~specified~~ safety function, as set forth in the CLB. Functionality does not apply to specified safety functions, but does apply to the ability of non-TS SSCs to perform other ~~specified~~ safety functions that have a necessary support function.

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

a. An SSC fails to conform to one or more applicable codes or standards (e.g., the CFR, operating license, TSs, UFSAR, and/or licensee commitments).

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

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.

03.07 Operability Declaration: An operability declaration is a decision by a senior licensed operator on the operating shift crew that there is a reasonable expectation that an SSC can perform its specified safety function.

03.08 Operable/Operability: The Standard Technical Specifications (NUREGs 1430-1434) define "O~~o~~perable/O~~o~~perability" 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

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[2] The NRC does not have specific qualification requirements for SSCs, except for electric equipment important to safety, as set forth in 10 CFR 50.49.

> 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). (emphasis added)

Operating reactors that have not adopted the Operable/Operability definition in NUREGs1430-1434 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 functions*, 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 function(s) are also capable of performing their related support function(s). (emphasis added)

Existing plant-specific TSs contain several variations on this basic definition. Therefore some judgment is needed in applying this guidance on operability. Word differences that exist are not viewed by NRC to imply a significant difference in application of the plant-specific TS. Any problems resulting from 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 TS definition of Operable/Operability governs.

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

03.09 <u>Reasonable Expectation</u>: The discovery of a degraded or nonconforming condition may call the operability of one or more SSCs into question. A subsequent determination of operability should be based on the licensee’s “reasonable expectation,” from the evidence collected, that the SSCs are operable and that the operability determination will support that expectation. Reasonable expectation does not mean absolute assurance that the SSCs are operable. The SSCs 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 SSCs 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.

03.10 <u>Specified Function/Specified Safety Function</u>: 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 CLB for the facility. In addition to providing the specified safety function, a system is expected to perform as designed, tested and maintained. When system capability is degraded to a point where it cannot perform with reasonable expectation or reliability, the system should be judged inoperable, even if at this instantaneous point in time the system could provide the specified safety function.

03.11 PRA Functionality: NEI 06-09, “Risk-Informed Technical Specifications Initiative 4b, Risk-Managed Technical Specifications (RMTS) Guidelines” utilizes the concept of "PRA Functionality" and defines the term as the following:

> If a component is declared inoperable due to degraded performance parameters, but the affected parameter does not and will not impact the success criteria of the PRA model, then the component may be considered PRA functional for purposes of the risk-informed completion time (RICT) calculation. For the provisions [of this section] to apply, the following must occur: (1) the degraded condition must be identified and its associated impact to equipment functionality is known, and (2) further additional degradation that could impact PRA functionality is not expected during the RICT.

NEI 06-09 describes the methodology for using the Risk-Informed Completion Time Program and was approved by the NRC on 5/17/07. Risk-Informed Technical Specification Task Force (TSTF) Initiative 4.b TSTF-505 provides risk-informed technical specifications completions times. The Risk-Informed Completion Time Program requires adherence to NEI 06-09,

0326-04 OPERABILITY DETERMINATION PROCESS

Determinations of operability are appropriate whenever a review, TS surveillance, or other information calls into question the ability of SSCs to perform specified safety functions. The operability determination process is used to assess operability of SSCs and support functions for compliance with TSs when a degraded or nonconforming condition is identified for a specific SSC described in TSs, or when a degraded or nonconforming condition is identified for a necessary and related support function. If an immediate threat to public health and safety is identified, actions should be taken quickly to place the plant in a safe condition in accordance with TS. PRA functional is used to calculate risk-informed extended TSs Completion Times; however, the concept of PRA functionality (Defined Term 3.11) does not apply to determinations of operability.

If the inspector has reason to question that action was delayed by the licensee when performing an operability determination for an SSC that is potentially degraded or nonconforming, then the inspector should, as appropriate, challenge the cause for delay and the basis for having a reasonable expectation of operability. The region may, with NRR concurrence as appropriate, ask that the licensee explain the perceived delay.

04.01 Review Activities

Reviewing the performance of SSCs and ensuring their operability is a continual process. Potential degraded or nonconforming conditions of SSCs may be discovered during many activities:

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. Inservice testing and inspection programs.
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 walkdowns and tours.
n. Plant systems walkdowns.
o. Quality assurance activities such as audits and reviews.
p. SSC performance reviews (including common-cause mode failures).
q. Vendor reviews or inspections.

04.02 <u>Assessing Potential Degraded or Nonconforming Conditions</u>

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.

04.03 <u>Presumption of Operability</u>

The TSs are organized and implemented on the presumption that systems are 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 on 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 specific sets of facts.

TS surveillances are performed periodically to verify that SSCs are operable. Satisfactory performance of a surveillance is usually 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 expectation, then performance of the surveillance requirement may not, by itself, be sufficient to demonstrate operability. Failure to conform to CLB criteria that are not needed to demonstrate operability should be addressed by the appropriate licensee process. An example of when a surveillance would not be sufficient to establish operability is the satisfactory completion of TS surveillance but with results that show a degrading trend and indicate that acceptance criteria might not be met before the next surveillance test. In this case, the surveillance actually identifies the conditions when the SSC will become inoperable and an operability evaluation would be warranted.

An application for this example is an emergency diesel generator that passes its monthly surveillance test. However, a licensee evaluation of vibration data recorded on a generator bearing could determine that the emergency diesel generator would not remain operable for its 30-day mission time. In this instance, the emergency diesel generator may be capable of passing several more surveillances with each test lasting only a few hours. While recording generator vibration data is not a requirement of TSs or an industry code or standard, once the degraded or nonconforming condition is identified, component operability should be immediately assessed.

04.04 <u>Scope of Operability Determinations</u>

The scope of an operability determination must 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, considering SSC functional requirements.

a. Operability determinations should include:

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

(2) The extent of condition for all similarly affected SSCs.

(3) The CLB requirements or commitments established for the affected SSC.

(4) The specified safety functions performed by the affected SSCs.

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

(6) Whether there is a reasonable expectation of operability, including the basis for the determination and any compensatory measures put in place to establish or restore operability.

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

(1) Design basis events are plant-specific, and plant-specific TSs, 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) The operability requirements for an SSC encompass all necessary support systems (per the TS definition of operability) regardless of whether the TSs explicitly specify operability requirements for the 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's CLB.

04.05 Circumstances Warranting Operability Determinations

Licensees should enter the operability determination process on discovering any of the following circumstances when the operability of any SSC described in TSs is called into question:

a. Degraded conditions.
b. Nonconforming conditions.
c. Discovery of an unanalyzed condition.

See Sections 2.1.b and Appendix C.9 for discussions of the relationship between necessary and related support functions and the operability of SSCs described in TSs.

If an SSC is clearly inoperable (e.g., loss of motive power or failed TS surveillance), it must be declared inoperable and the operability determination process, per this Part 9900 technical guidance, need not be entered. Note that other licensee processes and programs may need to be considered (e.g., corrective action program, availability, maintenance rule, reportablility) when SSCs are declared inoperable.

04.06 Timing of Operability Determinations

Operability should be determined immediately upon discovery that an SSC subject to TS is in a degraded or nonconforming condition. 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. If not able to conclude this, the licensee should declare the SSC inoperable. In any case, if the available information is incomplete, the licensee should promptly collect any additional information that is material to the determination (i.e., information that could result in a change to determination), and promptly make an operability determination based on the complete set of information. If, at any time, information is developed that negates a previous determination that there is a reasonable expectation that the SSC is operable, the licensee should declare the SSC inoperable. Appendix C of this manual chapter provides additional guidance on this subject.

04.06.01 Immediate Determination

After confirming the circumstances described in Section 4.5, an immediate determination of SSC operability should be completed. The determination should be made without delay and in a controlled manner using the best available information. Licensees should not postpone the determination 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 licensee should declare the SSC inoperable. 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 should be declared inoperable.

04.06.02 Prompt Determination

A prompt determination of SSC operability is a follow up to an immediate determination of SSC operability. A prompt determination is warranted when additional information, such as supporting analysis, is needed to confirm the immediate determination.

A prompt determination, when needed, should be done without delay. Licensees should make continuing progress toward completing the determination. A reasonable expectation of operability should exist while the prompt determination is being done.

A prompt determination is not always necessary. For example:

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

b. If sufficient information is 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 limit for completing a prompt determination. Nevertheless, timeliness is important and should depend on the safety significance of the issue. For example, it may be appropriate to make a prompt operability determination within a few hours for situations involving highly safety significant SSCs. Prompt determinations can often be done within 24 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) the licensee can evaluate the risk importance of the additional information to decide whether to prolong the operability determination. TSs completion time is one factor that can be used in determining an appropriate time frame within which a prompt determination should be completed.

04.07 Documentation

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 straightforward conditions, only the assumptions of the operability determination need be documented, but for complex conditions, detailed calculations may be necessary. Adequate documentation is necessary to establish a basis to allow for subsequent independent reviews. Immediate determinations need not be extensively documented; for example, it may be appropriate to accept a checked box. Plant record systems, such as operator logs or the corrective action program, are often sufficient documentation.

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.

04.08 Operator Awareness and Responsibilities

The operating shift crew is responsible for overall control of facility operation. As part of that responsibility, the operating shift crew must be aware of the operability and functionality of plant

SSCs and the status of degraded or nonconforming conditions that may affect plant operation. A senior licensed operator on the operating shift crew with responsibility for plant operations makes the declaration of operability, i.e., "makes the call" on whether an SSC described in TSs is operable or inoperable (Section 3.8).

Plant staff in other organizations (e.g., operations, engineering, and licensing) with expertise in the subject matter and appropriate knowledge of plant operations may prepare operability determinations. Whoever prepares the evaluation of degraded or nonconforming conditions should inform the licensed operators responsible for operating the plant of the discovery, and the status of evaluations that affect plant operation.

0326-05 FUNCTIONALITY ASSESSMENT

05.01 Functional

Functionality and operability are similar but separate concepts. While all licensees have a specific operability determination process for making operability determinations for SSCs described in TSs, including consideration of necessary and related support functions (Sections 2.1.b and Appendix C.9), most do not have a specific process for evaluating the functionality of SSCs not described in TSs. Refer to Attachment 2, "Scope of an Operability Determination as it Relates to the Scope of a Functionality Assessment." Normally, functionality is assessed and documented through 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 nonfunctional SSCs on compliance with other regulatory requirements (e.g., Appendix R, station blackout, ATWS, environmental qualification, maintenance rule) should be determined. PRA functional is used to calculate risk-informed extended TSs Completion Times; however, the concept of PRA functionality (Defined Term 3.11) does not apply to evaluating the functionality of SSCs not described in TSs.

05.02 Nonfunctional

If any SSCs not described in TSs have been determined to be nonfunctional, then the appropriate corrective actions should be taken. Note that other licensee processes and programs may need to be considered (e.g., availability, maintenance rule, reportability) when SSCs are not functional. Similarly, if any SSCs not in TSs have been determined to be functional, even though 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.

0326-06 OPERATIONS BASED ON OPERABILITY DETERMINATIONS

06.01 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 an SSC being unable to perform its specified safety function. This could be determined immediately upon discovery of the condition, (e.g., a self-revealing event that demonstrates the SSC is inoperable), as a result of the immediate operability determination, or as a result of the prompt operability determination.

06.02 <u>Operable but Degraded or Nonconforming</u>

If an SSC described in TSs 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, an SSC may be operable even though it may not conform to the environmental qualification requirements.

An SSC that is determined to be operable but degraded or nonconforming is considered to be in compliance with its TS LCO, and the operability determination is the basis for continued operation.[3] This is consistent with the plant TSs controlling decisions on plant operations. The basis for continued operation should be frequently and regularly reviewed 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. Guidance on correcting plant TSs when they are found to contain nonconservative values or to specify incorrect actions is given in Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient To Assure Plant Safety."

In some cases a licensee may discover a noncompliance with a regulation. The noncompliance with the regulation should be treated as a degraded or nonconforming condition, and the operability or functionality of affected SSCs assessed. If the noncompliance is not addressed by the operating license or the TSs (i.e., the noncompliance has no impact on any specified safety function), the licensee should determine if the noncompliance raises an immediate safety issue. The time taken to complete the corrective action should be commensurate with the safety significance of the noncompliance. 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 action required.

06.03 <u>Operability is Separate from Corrective Action to Restore Full Qualification</u>

The purpose of an operability determination is to provide a basis for making a timely decision on plant operation when a degraded or nonconforming condition is discovered. Corrective actions taken to restore full qualification should be addressed through the corrective action process. The

[3] 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 the licensee from continuing to operate or resuming operation until NRC approves.

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

06.04 Enforcement Discretion

In certain limited circumstances, a licensee may find that strict compliance with the TSs or a license condition would cause taking an action that is not in the best interest of public health and safety. If there is time to obtain an amendment, a licensee should seek to obtain it before taking action that is not in compliance with license conditions or TSs, except in certain emergency situations when 10 CFR 50.54(x) and (y) apply. If there is not sufficient time, licensees may seek enforcement discretion from the NRC. Guidance applicable to these limited circumstances is provided in NRC Inspection Manual, Part 9900: Technical Guidance, “Operations–Notices of Enforcement Discretion.”

0326-07 CORRECTIVE ACTION

07.01 The Current Licensing Basis and 10 CFR Part 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 TSs. Licensee operation and maintenance of the plant in accordance with the license, and any changes to the license, ensure 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 TSs can be made by license amendments. Licensees may make changes to a facility in accordance with 10 CFR 50.59. 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 or nonconforming conditions through corrective action, licensees may make changes to a facility in accordance with the appropriate change control process.

The NRC has also established requirements for plant operation during maintenance in accordance with the CLB. For degraded or nonconforming conditions of SSCs described in TSs, the license and TSs 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 change is risk-significant, a review of potential contingency plans for entering an increased risk profile should be done as well as a review of ongoing and planned maintenance activities.

NRC is also kept informed of operational events and plant operation issues by compliance with the reporting requirements in the TSs, 10 CFR 50.72, 50.73, 50.9(b), 10 CFR Part 21, and other parts of the CFR.

Collectively, these requirements are a process for ensuring that licensees either continue to operate in accordance with their plant's CLB, or place their plants in a safe condition and take prompt corrective action. Both the operability determination process and corrective actions for degraded or nonconforming conditions are intended to be consistent with the process for ensuring that licensees continue to operate the facility in accordance with the CLB.

07.02 Timing of Corrective Actions

The licensee should establish a schedule for completing a corrective action when an SSC is determined to be degraded or nonconforming. Licensees should address any degraded or nonconforming condition in a time frame commensurate with the safety significance of the condition, even though 10 CFR Part 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 consider safety significance, the effects on operability, the significance of the degradation, and what is necessary to implement the corrective action. The NRC may also consider 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. 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.

07.03 Compensatory Measures

When evaluating the effect of a degraded or nonconforming condition on an SSC's capability to perform any of its specified safety functions, 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 in 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 as the next logical step in support of corrective maintenance or to compensate for the degraded or nonconforming condition. Implementing compensatory measures for SSCs that have been determined to be degraded or nonconforming may restore plant operating margins.

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

The NRC expects that conditions calling for compensatory measures to restore SSC operability will be more quickly resolved than conditions that do not rely on compensatory measures to restore operability. 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 calling for compensatory measures to restore operability, where the compensatory measures substitute manual operator actions for automatic actions 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 instead of automatic actions to support operability determinations.

The licensee should evaluate the technical acceptability and effectiveness of a compensatory measure with respect 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. A licensee should pay particular attention to how compensatory measures could affect other aspects of the facility. For example, a licensee may plan to close a valve as a compensatory measure to isolate a leak. Although this action temporarily resolves the degraded condition, it may also affect flow distribution to other components or systems, complicate 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.”

07.04 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 SSC to the UFSAR described condition, no 10 CFR 50.59 screening and/or 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 description or analysis. 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 under the rule. The proposed final resolution may require staff review and approval (via 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 a licensee decides the final corrective action is 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. Both situations are discussed in greater detail below.

In both 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 in these conditions do not violate the TSs or the license. The basis for this authority to continue to operate is that the TSs contain 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.

07.04.01 Change to Facility or Procedures in Lieu of Full Restoration

In 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 and/or evaluation concludes that a change to the TSs 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.

07.04.02 Change to the Current Licensing Basis to Accept an As-Found Condition

In the other situation, the licensee proposes to change the CLB 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 and/or evaluation concludes that a change to the TSs 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 Part 50, Appendix B, Criterion XVI, “Corrective Action,” for significant conditions adverse to quality to determine the root cause, to examine other affected systems, to take action to prevent recurrence, and to report the original condition, as appropriate.

END

Appendix A
SURVEILLANCES

A.1 Operability during Technical Specification Surveillances

If performance of TSs surveillances requires that SSCs required to be operable by the TSs 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 the parts of the SSCs or system features that were altered to accomplish the surveillance.

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

A.2 System Configuration during Surveillance and Operability Testing

It is preferable that TS surveillances be performed in the same configuration and conditions representative of those the system must be in to perform its specified safety function. However, testing in other configurations or conditions may be required if testing in the specified safety function configuration would result in unjustifiable safety concerns or transients. In this case, the surveillance requirement acceptance criteria in the TSs 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 TSs. The system configuration for TS surveillance requirements is usually prescribed, and the acceptance criteria are based on the prescribed configuration.

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 a 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 TSs surveillance is missed, the TSs for a missed surveillance should 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, contains a TS allowance which gives the licensee time to perform a missed surveillance.

Subsequent to Generic Letter 87-09, Technical Specifications Task Force Traveler 358, Revision 6, “Missed Surveillance Requirements,” provided model TSs for risk informed options for delaying missed surveillances.

Use of SR 3.0.3 is not appropriate when a TSs surveillance has never been performed. In cases where a safety function required for operability has never been tested, reasonable assurance of operability does not exist. Licensees may use SR 3.0.3 when operability has been demonstrated outside of routine surveillances, e.g., for post-maintenance testing, or for testing resulting from normal or off-normal plant operations.

END

Appendix B
MAINTENANCE

B.1 Assessment and Management of Risk during Maintenance

After discovering a degraded or nonconforming condition, a licensee usually does corrective maintenance to restore an SSC to meet all aspects of the plant's CLB. The TSs 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 and by using the data to predict the future performance and condition of the SSCs and to assess the effectiveness of maintenance. Specifically, 10 CFR 50.65(a)(3) requires licensees to appropriately balance the objective of preventing failures of SSCs through maintenance (i.e., reliability) against the objective of maximizing availability of SSCs by 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 any resulting increases in overall plant risk.

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 exempt the licensee from complying with its license (including TSs) and other applicable regulations.

Maintenance activities may also require compensatory measures to allow the maintenance to be performed and/or to reduce risk. Compensatory measures for maintenance should be assessed consistent with NUMARC 93-01, Section 11, as endorsed by NRC regulatory guides. Certain compensatory measures may involve temporary procedures or facility alterations to allow the maintenance to be performed or to reduce risk. Examples are jumpered terminals, lifted leads, and temporary blocks, bypasses, or scaffolding. Temporary alterations for maintenance should be reviewed under 10 CFR 50.59, 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 TSs, particularly the operability provisions applicable to the protected SSCs. RIS 2001-09 states 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 functions. For SSCs described in TSs, such SSCs are clearly inoperable. The maintenance activity and any TSs required actions are expected to be finished within the allowed completion times. A licensee may take SSCs out of service to perform maintenance during power operation of the plant, but the SSC must meet the requirements of 10 CFR 50.65 as well as the TS requirements. 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 Operable vs. Available

Operability is defined in Section 1.1 of the Standard Technical Specifications. Both the maintenance rule and the performance indicator (PI) process use the word "availability" relative to the functions being monitored by the maintenance rule and the PI process. The difference between "operability" and "availability" lies in the function being reviewed; to understand the differences the inspector should review supporting documents for the maintenance rule and the PI process (NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines") including 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~~ safety function or functions. The reliability is initially based on design verification, quality assurance, production testing, and acceptance processes. In service, reliability is based on operating experience (i.e., the SSC successfully performs its ~~specified~~ safety function or functions on demand). Reliability is often expressed in numbers of successes for a given number of demands.

When an SSC experiences multiple failures, especially repetitive failures (i.e., failures for the same or a similar cause) such as those addressed in licensees' maintenance rule 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 considered degraded or nonconforming and should be evaluated to determine whether the SSC is operable. Non-TS SSCs with reduced reliability should be similarly treated as described in this document. When an SSC's capability or reliability is degraded to the point where there is no longer a reasonable expectation that it can perform its specified safety function, the SSC should be judged inoperable. A reliability reduction that calls into question the ability of an SSC to perform its specified safety function requires an operability determination.

Various factors may contribute to reduced reliability. 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. The plant's probabilistic risk assessment (PRA) uses assumed or default values for SSC failure rates, another expression of reliability, in 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 PRA derivatives such as risk assessment tools to reflect the actual risk environment. Regulatory Guide 1.200, " An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," provides the NRC position on frequency for updating PRA reliability and unavailability data.

END

Appendix C
SPECIFIC OPERABILITY ISSUES

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

The general design criteria (GDC) and the TSs differ in that the GDC specify requirements for the design of nuclear power reactors, whereas the TSs specify requirements for the operation of nuclear reactors. This section provides a general context for the relationship between GDC and TSs. Some facilities were licensed before the GDC were codified in 10 CFR. As a result the applicability of the GDC varies among facilities. In all cases, the plant-specific current licensing basis governs.

The criteria in the GDC correspond both directly and indirectly to the operational requirements in the TSs. The GDC "establish the necessary design, fabrication, construction, testing, and performance requirements for SSCs important to safety." Thus the GDC cover a broad category of SSCs that are important to safety including those SSCs that are covered by TSs. The final safety analysis report (FSAR) describes both the design capability of the facility to meet the GDC (or a plant-specific equivalent) and the operational restrictions, which are to be included in the TSs. The staff safety evaluation documents the acceptability of these analyses, and it is the combination of the FSAR analyses and the staff safety evaluation that forms the bases from which the TS are derived. It is important to note that the GDC cover a broader scope of SSCs than the TS because the TS establish, among other things, the limiting conditions for operations (LCOs). LCOs are the "lowest functional capability or performance levels of equipment required for safe operation of the facility."~~Thus, the GDC cover a broad spectrum of SSCs, not all of which are described as subject to the TSs. The GDC are reflected in the facility design as described in the UFSAR. The license includes TSs that are derived from the facility design requirements and from analyses that support the facility design as described in the UFSAR and NRC evaluations of the UFSAR analyses. While a variety of features must be included in the design of a nuclear power reactor, the TSs need control only aspects of the design and plant conditions required to satisfy 10 CFR 50.36.~~ As stated in 10 CFR 50.36, ~~TSs are to be~~ "[The technical specifications will be derived from the analyses and evaluations included in the safety analysis report […]." ~~The TSs 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 TSs illustrate the relationship between the GDC and the TSs. 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 TSs typically allow a facility to continue to operate for a specified time with only one train of a two-train safety system operable. In that case, the GDC are met because the system design provides the necessary redundancy. The TSs permit 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. Not all GDC that are included in the CLB are explicitly identified in TS. However, those that are not explicitly identified may still need to be considered when either determining or to establish the basis for operability of TS SSCs.

Any nonconformance with a GDC or f~~F~~ailure to meet a GDC included in the CLB should be treated as a degraded or nonconforming condition and evaluated to determine if a safety function or a necessary and required support function of a TSs SSC is affected. As with any degraded or nonconforming condition, the technical guidance in this document is applicable~~, therefore, the~~

~~technical guidance in this document is applicable~~.

C.2 Single Failures

A single failure is defined as follows in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."

> 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 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, 21, 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 or functions.

Any nonconformance ~~A design deficiency~~ by which the capability to withstand a single failure is compromised should be treated as a degraded or nonconforming condition and evaluated to determine if a safety function or a necessary and required support function of a TSs SSC is affected. As with any degraded or nonconforming condition, the technical guidance in this document is applicable.

C.3 Treatment of Consequential Failures in Operability Determinations

A consequential failure is a failure of an SSC caused by a postulated accident within the design basis. For example, if a broken pipe whips and incapacitates a nearby pump during a loss-of-coolant accident (a design basis event), the pump cannot function. Such a pump failure is called a consequential failure because the pump fails 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, the broken pump cannot be credited in the safety analysis for loss of coolant accident mitigation.

When an 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 are the direct consequence of a design basis event for which the degraded or nonconforming SSC needs to function). Where a consequential failure (i.e., considering the degraded or nonconforming condition) would cause the loss of a specified safety function or functions 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.4 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 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. Section 50.59 is applicable upon implementation of the 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 determinations. The use of alternative methods should generally be handled as follows:

a. Occasionally, 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 TSs, license condition, or regulation. For example, the methods used to determine limits placed in the core operating limits report (COLR) may be specified in TSs. 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 analytical method must be technically appropriate to characterize the SSCs involved, the nature of the degraded or nonconforming 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, including the differences between the CLB-described analyses 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 CLB. For example, if the current performance levels are expressed in terms of Rem, the method cannot generate results expressed in TEDE.

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

   (5) Acceptable alternative methods such as 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 by performing a benchmark comparison of the non-CLB analysis methods to the applicable CLB analysis methods.

(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 reviewers qualified to verify results.

C.5 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 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 consider SSCs operable by taking credit for manual action in place of automatic action for protection of safety limits. This does not forbid 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 all combinations of circumstances have been reviewed from an operability standpoint.

For situations where substitution of manual action for automatic action is proposed for an operability determination, the evaluation 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 or functions. The physical differences to be considered 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. The licensee should have written procedures in place and personnel should be trained on the procedures before any manual action is substituted for the loss of an automatic action.

The assignment of a dedicated operator for a manual action requires written procedures and full consideration of all pertinent differences. The consideration of a manual action in remote areas must include the abilities of the assigned personnel and how much time is needed to reach the area, training of personnel to accomplish the task, and occupational hazards such as radiation, temperature, chemical, sound, or visibility hazards. One reasonable test of the reliability and effectiveness of a manual action may be the approval of the manual action for the same function at a similar facility. Nevertheless, a manual action is expected to be a temporary measure and to promptly end when the automatic action is corrected in accordance with 10 CFR Part 50, Appendix B, and the licensee's corrective action program.

C.6 Use of Probabilistic Risk Assessment in Operability Decisions

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

However, PRA may provide valid and useful supporting information on the timeliness of a prompt operability decision and a corrective action. 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 timeliness of operability determinations.

C.7 Environmental Qualification

When a licensee identifies a degraded or nonconforming condition that affects compliance with 10 CFR 50.49, (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 their specified safety functions. In this connection, it must also be shown that subsequent failure of the equipment, if likely under accident conditions, will not result in a consequential failure as discussed in Section C.3.

C.8 Technical Specification Operability vs. ASME OM Code Criteria

The TSs 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 conditions must be entered.

The ASME Operation and Maintenance of Nuclear Power Plants (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). 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 pump and valve testing. When performance data fall outside the required action range, regardless of whether the limit is equal to the TSs limit or more restrictive, the pump or valve must be declared inoperable immediately (the word "inoperative" is used in the text of the ASME Code, i.e., the pump or valve is both "inoperative" and inoperable) and the LCO must be declared not met and the applicable conditions must be entered.

When the required action range is more limiting than its corresponding TS, the corrective action need not 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, allowing a new operability determination.

The NRC does not accept durations specified by the ASME OM Code for analyzing test results as a reason 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 full-stroke time for valves, the associated component must be declared inoperable, and if subject to the TSs, 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 IST program but not subject to TSs, the action should be consistent with the safety significance of the issue and the functions served by the affected system or systems.

Recalibrating test instruments and then repeating pump or valve tests are acceptable as an alternative to repair or replacement, but cannot be done 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 test, anomalous data with no clear indication of the cause must be attributed to the pump or valve under test. In that case, a prompt determination of operability is appropriate with follow-on corrective action as necessary.

C.9 Support System Operability

The definition of operability assumes that an SSC described in TSs can perform its specified safety function when all necessary support systems are capable of performing their related support functions. Each licensee must understand which support systems are necessary to ensure operability of supported TS systems.

In some cases, the licensee could use "engineering judgement" in determining whether a support system that is not described in TSs is necessary and is, therefore, required to be capable of performing its related support function. The licensee may need to apply engineering principals in the final analysis of the basis for the decision. 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 functions, 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) 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 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 TSs should be implemented. The licensee must verify 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 TSs may contain specific requirements or allowances regarding support systems. In all cases, a licensee's plant-specific TSs are governing.

C.10 Piping and Pipe Support Requirements

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

Specific operability criteria for concrete anchor bolts and pipe supports are given 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 are described in internal NRC memos dated July 16, 1979 (ADAMS Accession No. ML 993430206), and August 7, 1979 (ADAMS Legacy Library Accession No. 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 Boiler and Pressure Vessel Code for operability determinations. The licensee should continue to use these criteria until CLB criteria can be satisfied (normally the next refueling outage). For SSCs that do not meet the above criteria but are otherwise determined to be operable, licensees should treat the SSCs as if inoperable until NRC approval is obtained to use any additional criteria or evaluation methods to determine operability. Where a piping support is determined to be inoperable, the licensee should determine the operability of the associated piping system.

C.11 Flaw Evaluation

In accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.55a(g), structural integrity must be maintained in conformance with American Society of Mechanical Engineers (ASME) Code Section XI for those parts of a system that are subject to ASME Code requirements. 10 CFR 50.55a(g)(4) further requires, "Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) which are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI..."

ASME Section XI is generally written for preservice and inservice weld examinations and any identified flaws. ASME Section XI, Article IWA 3000 contains weld examination flaw acceptance standards. If flaws are found in components for which ASME Section XI has no acceptance standards, then the construction code is to be used to establish the acceptance standards. This is supported by Sub-article IWA-3100(b) which states "if acceptance standards for a particular component, Examination Category, or examination method are not specified in this Division [Division 1] then flaws that exceed the acceptance standards for materials and welds specified in the Section III Edition applicable to the construction of the component shall be evaluated to determine disposition

The ASME Code contains requirements describing acceptable means of performing preservice and inservice inspection of welds and certain other locations in piping, vessels, and other pressure boundary components. For preservice and inservice inspections, the ASME 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 specified acceptable flaw sizes, the

ASME Code describes an alternate method by which a calculation may be performed to evaluate the acceptability of the flaw. While ASME Section XI does not specifically provide flaw acceptance standards for components other than those specified in Table IWX-2500-1, its methods and standards may be applied to other components when appropriate as determined by the licensee.

When ASME Class 1 components do not meet ASME Code or construction code acceptance standards, the requirements of an NRC endorsed ASME Code Case, or an NRC approved alternative, then an immediate operability determination cannot conclude a reasonable expectation of operability exists and the components are inoperable. Satisfaction of Code acceptance standards is the minimum necessary for operability of Class 1 pressure boundary components because of the importance of the safety function being performed.

When ASME Class 2 or Class 3 components do not meet ASME Code or construction code acceptance standards, the requirements of an NRC endorsed ASME Code Case, or an NRC approved alternative, then a licensee must make a determination of whether the degraded or nonconforming condition results in a TS-required SSC or a TS-required support SCC being inoperable. In order to determine the component is operable under an immediate operability determination, the degradation mechanism must be readily apparent. To be readily apparent, the degradation mechanism must be discernable from visual examination (such as external corrosion or wear), or there must be substantial operating experience with the identified degradation mechanism in the affected system. In addition, detailed non-destructive examination data may be necessary to determine a component is operable under an immediate operability determination. If detailed non-destructive examination is necessary and the examination cannot be completed within the time frame normally expected for an immediate operability determination, the component should be declared inoperable and the appropriate TS action statement entered. As outlined under defined terms, Section 3.9, Reasonable Expectation, there is no indeterminate state of operability. An SSC is either operable or inoperable. Through-wall leakage and the methods to evaluate through-wall leakage are further addressed in section C.12.

The NRC staff accepts ASME Code Case N-513[1],“Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 piping Section XI, Division 1,” as an acceptable alternative to the ASME Code requirements for evaluating the structural integrity for flaws identified in moderate-energy piping. Regulatory Guide (RG) 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1” endorses code cases, some with conditions. Refer to RG 1.147 for the latest revision accepted by the NRC. At the time of this writing, RG 1.147 endorses Code Case N-513[1] with the following conditions:

a. Specific safety factors in paragraph 4.0 of ASME Code Case N-513[1] must be satisfied, and

[1] Refer to RG 1.147 for the latest revision acceptable to the NRC, and any conditions placed upon the code

b. ASME Code Case N-513[1] 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, but thread integrity must be maintained), and
(4) degraded socket welds.

In addition, the NRC issued Generic Letter (GL) 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," which permits licensees to consider either the "through-wall flaw" or the "wall thinning" flaw evaluation approach when assessing the structural integrity of moderate- energy piping with identified through-wall flaws. If the flaw is found acceptable by the "through-wall flaw" approach, a temporary non-code repair may be made following NRC staff review and approval of the evaluation. A non-code repair is a repair not in compliance with the construction code or ASME Section XI. Compensatory actions may be implemented by the licensee without NRC staff review and approval, provided the compensatory action does not involve a non-code repair to the piping system or supports and the compensatory action can be implemented in accordance with 10 CFR50.59. If the flaw is found acceptable by the "wall thinning" approach, immediate repair of the flaw is not required; but the licensee should comply with the guideline for flaw repair and monitoring. Whenever a flaw does not meet ASME Code or construction code acceptance standards or the requirements of an NRC endorsed ASME code case, a relief request is required. Whenever a flaw does not meet ASME Code or construction code acceptance standards or the requirements of an NRC endorsed ASME code case, a relief request needs to be submitted in a timely manner after completing the operability determination process documentation.

The NRC staff accepts the ASME Code, construction code, GL 90-05, ASME Code Case N-513[1], and any other applicable NRC-approved ASME Code Case criteria for conclusively establishing that a TS-required ASME Code Class 2 or 3 piping system that contains a flaw has adequate structural integrity and is, therefore in a degraded but operable condition. ASME Code Cases which describe methods, criteria, or requirements different from the ASME Code referenced in 10 CFR 50.55a cannot be used to evaluate the acceptability of a flaw without prior NRC review and approval unless the ASME Code Cases are endorsed in the applicable regulatory guides.

Therefore, the table below summarizes the methods available to licensees which are acceptable to the NRC staff for evaluating structural integrity of flaws found in boiling or pressurized water-cooled nuclear power facilities on components (including supports) classified as ASME Code Class 1, Class 2, and Class 3 components.

[1] Refer to RG 1.147 for the latest revision acceptable to the NRC, and any conditions placed upon the code case.

Methods Available to Evaluate Structural Integrity

Pipe Class/Energy	ASME Code Section XI/ Construction Code	NRC Approved Alternative e.g. RG approved Code Case	Code Case N-513[1]	GL 90-05
Class 1/HE	X	X		
Class 2/HE	X	X		
Class 2/ME	X	X	X	
Class 3/HE	X	X		X
Class 3/ME	X	X	X	X

Once a flaw is determined to be unacceptable, regardless of whether the degraded component is degraded but operable, or inoperable, the component must be restored to meet ASME Code or construction code requirements, requirements of an NRC endorsed ASME Code Case, or an NRC approved alternative. If this involves physical changes to the components, it must be completed in accordance with ASME Section XI, IWA-4000. The NRC staff expects that components be restored to ASME Code or construction code acceptance standards by the end of the next refueling outage.

C.12 Operational Leakage from ASME Code Class 1, 2, and 3 Components

Leakage from the reactor coolant system is limited to specified values in the TSs 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 TS conditions must be entered. For identified reactor coolant system leakage within the TS limits, the licensee should make an immediate operability determination for the degraded component (i.e., the leaking component) and include in the determination the effects of the leakage on other components and materials.

The regulations require that the structural integrity of ASME Code Class 1, 2, and 3 components be maintained in accordance with the ASME Code or construction code acceptance standards. If a leak is discovered in a Class 1, 2, or 3 component while conducting an inservice inspection, maintenance activity, or during facility operation, any corrective measures to repair or replace the leaking component must be performed in accordance with IWA-4000 of Section XI. The NRC staff expects that components be restored to ASME Code or construction code acceptance standards by the end of the next refueling outage.

The operational leakage TS LCO does not permit any reactor coolant pressure boundary leakage. Upon discovery of leakage from a Class 1 pressure boundary component (pipe wall, valve body, pump casing, etc.), the licensee must declare the component inoperable. Upon discovery of leakage from a TS-required Class 2 or Class 3 component (“Time of Discovery” for Performance Indicator and risk/PRA evaluations), the component is evaluated in an immediate determination of operability (followed by a prompt determination if additional or supporting analysis is needed) to support a reasonable expectation of operability. In performing the immediate determination, the degradation mechanism would have to be readily apparent to support a determination of operable. To be readily apparent, the degradation mechanism must be discernable from visual inspection (such as external corrosion or wear) or substantial operating experience must exist with the degradation mechanism on the system at the facility. In addition, detailed non-destructive examination data may be necessary to support an immediate expectation of operability determination. If detailed non-destructive examination is necessary and the examination cannot be completed within the time frame normally expected for an immediate operability determination, the component should be declared inoperable and the appropriate TS required actions taken. As outlined under defined terms, Section 3.9, Reasonable Expectation, there is no such thing as an indeterminate state of operability; an SSC is either operable or inoperable. GL 90-05 provides guidance for the evaluation of Class 3 piping and ASME Code Case N-513[1] provides guidance for the evaluation of Class 2 and Class 3 moderate energy piping. As noted above, upon discovery of leakage from a TS-required Class 2 or a Class 3 pressure boundary component a prompt operability determination supporting analysis to characterize the flaw may be needed. In performing the prompt operability determination, the licensee must evaluate the structural integrity of the leaking component using the actual geometry of the through-wall flaw characterized or bounded with volumetric examination methods. 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. However, even though the outside surface breaking dimension of a through-wall flaw may be small, the length and extent of the flaw inside the component wall may be quite long and potentially result in inadequate structural integrity of the component.

To evaluate the structural integrity of the leaking component, the licensee may use the criteria in Section XI of the ASME Code, the construction code, or any applicable ASME Code Case approved by the NRC. In addition, the licensee may evaluate the structural integrity of Class 3 piping by evaluating the flaw using the criteria of paragraph C.3.a of Enclosure 1 to GL 90-05. If the flaw meets the GL 90-05 criteria, the piping is degraded but operable. However, relief from ASME Code requirements is needed even if the structural integrity is found acceptable when applying GL 90-05. Whenever a flaw is through-wall in an ASME Code component when evaluated using GL 90-05, a relief request needs to be submitted in a timely manner after completing the operability determination process documentation and prior to implementing a non-code repair/replacement activity to the SSC.

Alternatively, the licensee may evaluate the structural integrity of leaking Class 2 or Class 3 moderate-energy piping using the criteria of ASME Code Case N-513[1] or any other applicable NRC approved ASME Code Case, as indicated in the table in Appendix C.11, “Flaw Evaluation.” If the flaw in the leaking component has adequate structural integrity in accordance with criteria of an ASME Code Case acceptable to the NRC staff, the piping can be deemed degraded but operable and continued temporary service of the degraded piping components is permitted. A relief request is not necessary when evaluated in accordance with an NRC approved code case as endorsed by the code case regulatory guide, and the evaluation results demonstrate adequate structural integrity. Components with these flaws must be restored to ASME Code or construction code requirements through repair/replacement or meet requirements acceptable to the NRC, as approved in a relief request or ASME Code Case approved under the RGs prior to the completion of the next scheduled refueling outage. Other compensatory actions may be

[1] Refer to RG 1.147 for the latest revision acceptable to the NRC, and any conditions placed upon the code case.

taken by the licensee, provided these compensatory actions are within the limitations of 10 CFR 50.59.

The NRC staff does not consider through-wall conditions in components, unless intentionally designed to be there such as sparger flow holes, to be in accordance with the intent of the ASME Code or construction code and, therefore, would not meet code requirements, even though the system or component may demonstrate adequate structural integrity. Thus, unless a through-wall flaw is evaluated and found acceptable using an applicable and NRC endorsed code case, in which all provisions are met including any additional requirements or limitations imposed by the RG endorsing the code case, a relief request is necessary.

Once a component is evaluated for structural integrity using criteria acceptable to the NRC staff as described herein, and determined to be unacceptable, the component has to be declared inoperable and the technical specification action statements for the applicable system must be followed.

If the licensee decides to control the leakage and maintain structural integrity by mechanical clamping means, the requirements of ASME Code Case N-523[1], "Mechanical Clamping Devices for Class 2 and 3 Piping Section XI, Division 1," may be followed, because the NRC staff endorses this Code Case in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1". This Code Case applies to structural integrity of Class 2 and 3 piping which is 6 inches (nominal pipe size) and smaller and shall not be used on piping larger than 2 inches (nominal pipe size) when the nominal operating temperature or pressure exceeds 200°F or 275 psig. These and other applicable ASME Code Cases which have been determined to be acceptable for licensee use without a request or authorization from the NRC are listed in RG 1.147 for ASME Section XI and RG 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III," for ASME Section III. These ASME Code Cases do not apply to Class 1 pressure boundary components.

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

C.13 Structural Requirements

Structures may be required to be operable by the TSs, or they may be related support functions for SSCs in the TSs. Examples of structural degradation are concrete cracking and spalling, excessive deflection or deformation, water leakage, rebar corrosion, missing or bent anchor bolts, and degradation of door and penetration sealing. If a structure is degraded, the licensee should assess the structure's capability of performing its specified function. As long as the identified degradation does not result in exceeding acceptance limits specified in applicable design codes

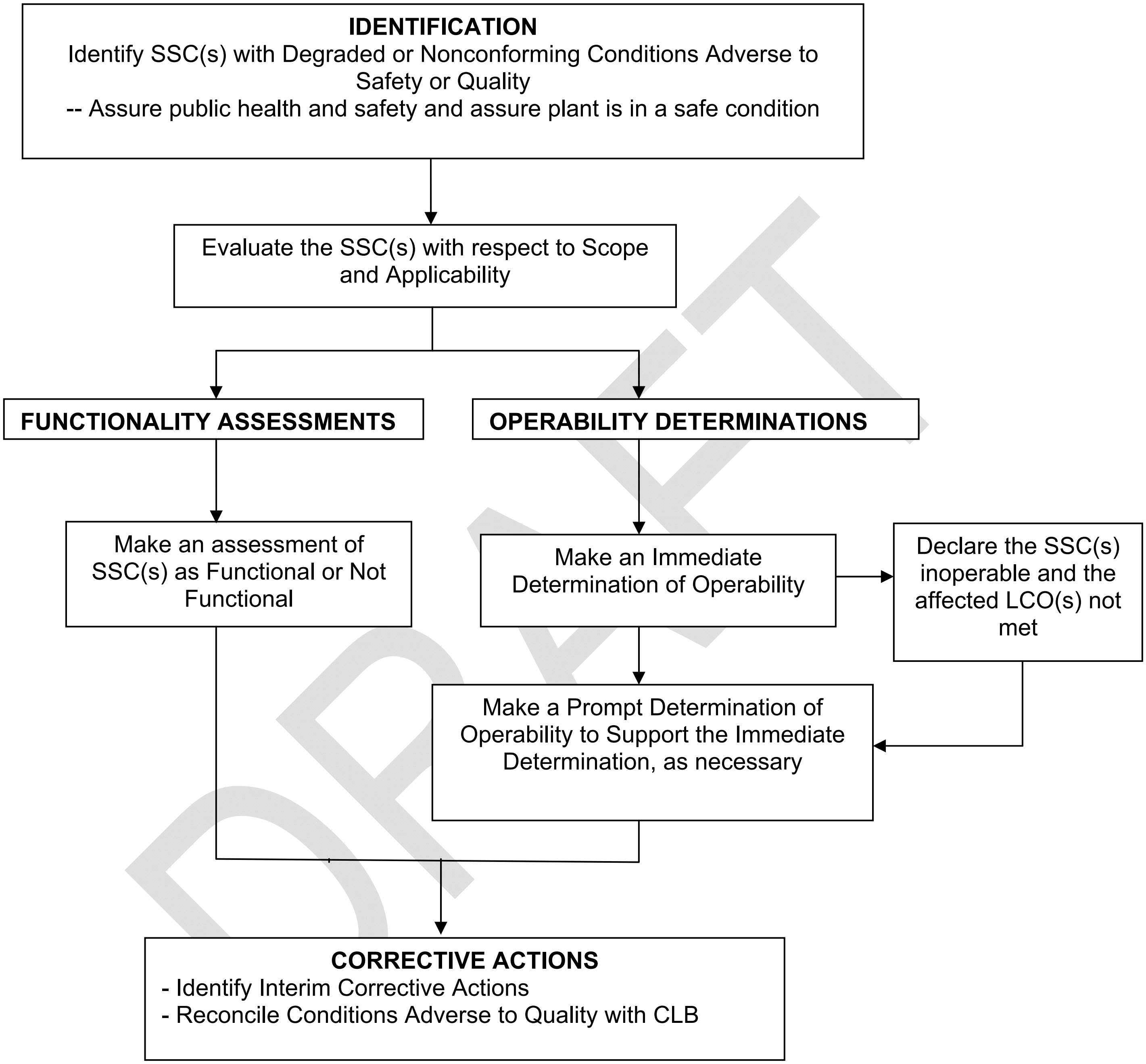
[1] Refer to RG 1.147 for the latest revision acceptable to the NRC, and any conditions placed upon the code case.

and standards referenced in the design basis documents, the affected structure is either operable or functional.

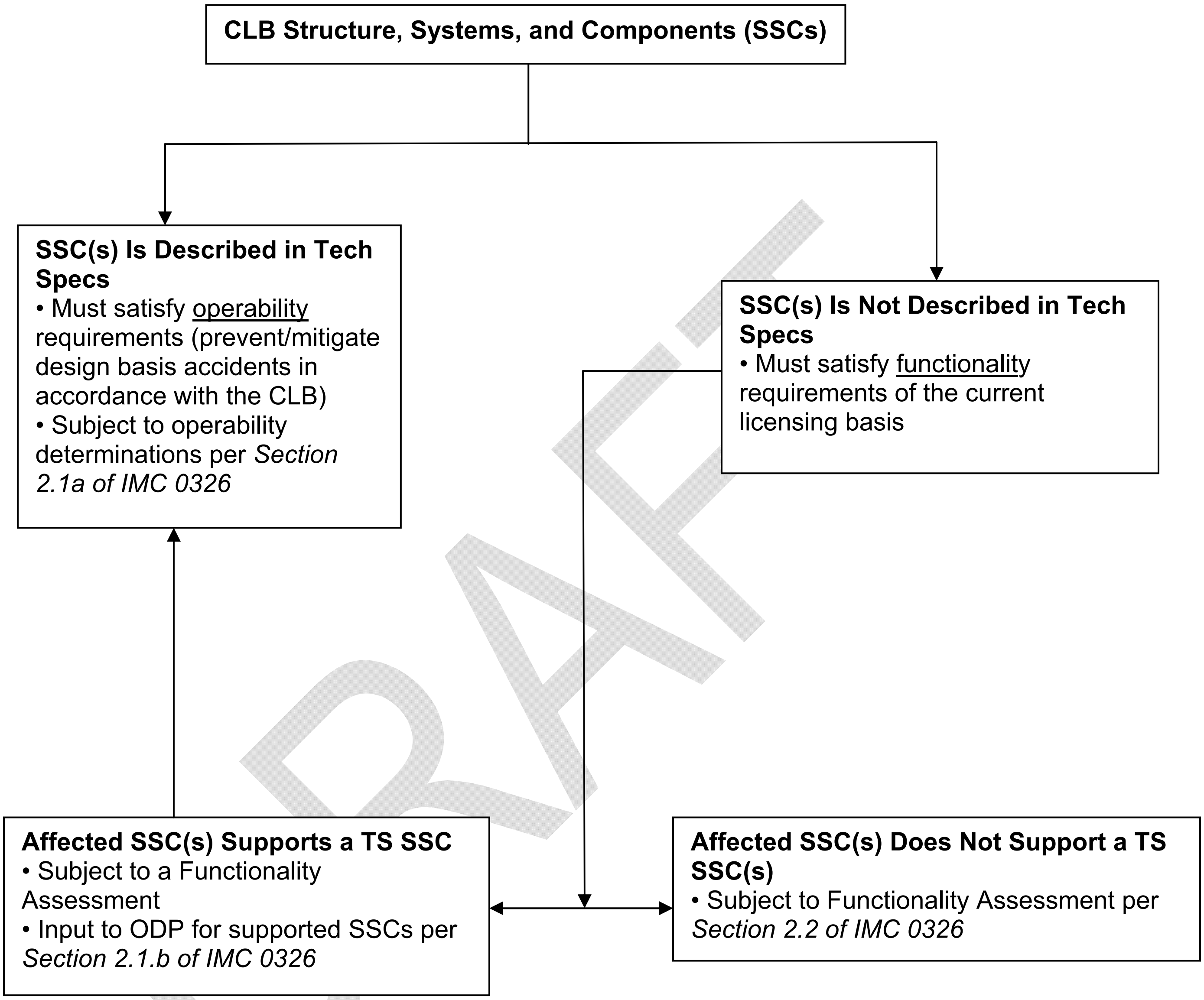
NRC inspectors, with possible headquarters support, should review licensees' evaluations of structural degradations to determine their technical adequacy and conformance to licensing and regulatory requirements.

END

Attachment 1: Operability Determination and Functionality Assessment Flowchart



Attachment 2: Scope of an Operability Determination as it Relates to the Scope of a Functionality Assessment



Attachment 3 - Revision History for IMC 0326,
“Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety”

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number
None	ML12346A480 Issue Date: 01/xx/2013	IM Technical Guidance STSODP “Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety” is being issued, without changes as IMC 0326, “Operability Determinations & Functionality Assessments For Conditions Adverse To Quality Or Safety”	None	None