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OFFICE OF NUCLEAR REACTOR REGULATION  
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**NRC REGULATORY ISSUE SUMMARY 2012-xx**  
**NRC POSITION ON THE RELATIONSHIP BETWEEN GENERAL DESIGN CRITERIA AND**  
**TECHNICAL SPECIFICATION OPERABILITY**

**ADDRESSEES**

All holders of, and applicants for, power reactor operating licenses issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

**INTENT**

The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to clarify the relationship between Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, and 10 CFR 50.36, "Technical Specifications." In addition, the RIS is clarifying the process for addressing nonconformances with general design criteria (GDC) as incorporated into a plant's current licensing basis (CLB). This RIS does not transmit any new requirements and does not require any specific action or written response on the part of an addressee.

**BACKGROUND INFORMATION**

Recently, the NRC has received questions about the relationship between licensing basis design requirements, such as the GDC as incorporated into the plant CLB, and technical specification (TS) operability requirements. The relationship between CLB design requirements and the TS was addressed in a memorandum from Thomas E. Murley, Director, Office of Nuclear Reactor Regulation (NRR) to the NRR staff, dated January 24, 1994 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12115A279). The positions described in this memo were incorporated into the Inspection Manual Part 9900 Technical Guidance, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety (Operability Determination Process)," which was issued as the attachment to RIS 2005-20, Revision 1, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, 'Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety'" (ADAMS Accession No. ML073531473).

**ML12137A346**

The GDCs or a plant-specific equivalent<sup>1</sup>, as incorporated into the CLB, have an important relationship to the operability requirements of the TS. Comprehending this relationship is critical to understanding how licensees should address nonconformances with CLB design requirements. This RIS discusses these relationships to promote a more comprehensive understanding of how the NRC requirements work in concert with TS to ensure plant safety.

## **RELATIONSHIP OF THE GDC TO THE TECHNICAL SPECIFICATIONS**

The GDC and the TS differ in that the GDC specify NRC's requirements for the *design* of nuclear power reactors, whereas the TS are included in the license and specify requirements for the *operation* of nuclear power reactors. Design requirements, such as GDCs or similar requirements, are typically included in the licensing basis for every nuclear power plant. GDCs, according to Appendix A to 10 CFR Part 50, "establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components (SSCs) important to safety." As such, the GDCs cover a broad category of SSCs that are important to safety, including those SSCs that are covered by TS. 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 TS, are described in the final safety analysis report (FSAR). 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 GDCs 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." Section 182 of the Atomic Energy Act of 1954, as amended and as implemented by 10 CFR 50.36, requires that those design features of the facility that, if altered or modified, would have a significant effect on safety, be included in the TS. Thus, TS are intended to ensure that the most safety-significant design features of a plant, as determined by the safety analysis, maintain their capability to perform their safety functions.

## **TECHNICAL SPECIFICATION OPERABILITY DETERMINATIONS AND THE GDC**

Recently, the NRC staff learned that some licensees follow their corrective action program for an identified nonconformance with a CLB design requirement, such as a GDC, or a plant-specific equivalent, that is part of the plant's CLB without consideration of the need to apply the Part 9900 operability determination process. To the NRC staff it appears that not every licensee understands the relationship between CLB design requirements and TS requirements for nonconforming conditions or that the Part 9900 operability determination process also applies to nonconforming conditions.

As noted in the January 24, 1994, memo, not all GDCs 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. It is the staff's position that any nonconformance with a GDC, or a plant-specific equivalent included in the CLB should be evaluated to determine if the nonconformance affects or alters the operability status of a TS SSC.

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<sup>1</sup> For example, plants with construction permits issued prior to May 21, 1971, may have been approved for construction based on the proposed General Design Criteria published by the Atomic Energy Commission (AEC) in the Federal Register (32 FR 10213) on July 11, 1967, sometimes referred to as the AEC Draft GDC.

As set forth in Part 9900, a documented determination is needed to establish the basis for concluding that an SSC remains capable of performing its safety function in the presence of the nonconforming condition. Part 9900 states that a “degraded condition is one in which the qualification of an SSC or its functional capability is reduced.” Similarly, Part 9900 defines a nonconforming condition as “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.” Examples of nonconforming conditions include: (1) an SSC that fails to conform to one or more applicable codes or standards (e.g., the CFR, operating license, TS, updated final safety analysis report, or licensee commitments), (2) an as-built or as-modified SSC that does not meet the current licensing basis, (3) operating experience or engineering reviews that identify a design inadequacy, or (4) documentation required by NRC requirements such as 10 CFR 50.54, “Conditions of licenses,” or 10 CFR 50.59, “Changes, Tests, and Experiments,” that is unavailable or deficient.

Section 3.8 of Part 9900 covers the definition of operability. The definition includes the following statement:

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. [Emphasis added]

Section 4.0 of Part 9900 states the following:

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 TS ***when a degraded or nonconforming condition is identified for a specific SSC described in TS, or when a degraded or nonconforming condition is identified for a necessary and related support function***. [Emphasis added]

Section 3.10 of Part 9900 further defines “specified function/specified safety function” as follows:

The specified function(s) of the system, subsystem, train, component, or device (required by the definition of operability) is that specified safety function(s) in the CLB for the facility. In addition to providing the specified safety function required by the TSs definition of operability, 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. [Emphasis added]

Thus, an operability determination (or functionality assessment) is performed upon identification of a degraded or nonconforming condition, including any nonconforming condition with a GDC included in either the CLB for an SSC described in TS or for a necessary and related support function required by the definition of operability. If the licensee determination concludes that the TS SSC is nonconforming but operable or the necessary and related support function is nonconforming but functional, it would be appropriate to address the nonconforming condition through the licensee’s corrective action program. As stated in Section 6.3 of Part 9900:

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 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).

Example: Operability Determination for a Nonconformance with GDC 2 for Natural Phenomenon

The following example discusses a nonconforming condition that involves a failure to meet the current licensing basis because of improper construction:

As indicated in the January 24, 1994, memo, the design bases for protection against natural phenomena (GDC 2), when included in the CLB, are inherently considered in the operability of safety-related SSCs that satisfy the criteria for inclusion in the TS. The Part 9900 operability determination process should be entered when a licensee identifies any nonconformance with GDC 2 or its equivalent, as incorporated into a plant licensing basis (e.g., nonconformance with the CLB for protection against flooding, seismic events, tornadoes, etc.). Criterion 2 of the GDC states:

Design bases for protection against natural phenomena. Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The design bases for these structures, systems, and components shall reflect: (1) Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena and (3) the importance of the safety functions to be performed.

Licensees can implement GDC 2 in the design by specifying design bases for combinations of normal and accident conditions to protect SSCs from the effects of natural phenomena. Failure to meet GDC 2, as described in the licensing basis should be treated as a nonconforming condition and is an entry point for an operability determination for any impacted TS-required SSC or a necessary and related support function.

For example, if a licensee with GDC 2 in its CLB identified that the exhaust stacks for the emergency diesel generators (EDGs) were not protected from the impact of tornado missiles, then this condition would call into question the operability of the EDGs. EDG operability is called into question because the exhaust stacks are an integral component of the EDGs, which, if crimped by a missile, could prevent the EDGs from performing their specified safety function. Accordingly, the licensee should then enter the operability determination process to evaluate the impact of not meeting the CLB requirement for tornado missile protection. If the licensee's

evaluation concludes that the EDGs are inoperable, then the licensee must enter its TS and follow the applicable required actions. As stated in Section 7.3 of Part 9900, the licensee may implement compensatory measures to 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.” If the licensee successfully implements compensatory measures to restore the inoperable EDGs to an operable but nonconforming status; or if the licensee’s operability determination evaluation concludes that the EDGs are operable and nonconforming, then the licensee should use its corrective action program to bring the EDGs back into conformance with the CLB.

## **SUMMARY**

In summary, TS SSCs must be capable of performing their specified safety function (i.e., be operable or have operability) whenever a plant is operating in the modes and other specified conditions of the applicability of TS limiting conditions for operation. In addition to providing the safety function, a system is expected to perform as designed, tested, and maintained. Any nonconformance with a GDC in the CLB has the potential to negatively impact the operability of a TS SSC and must be evaluated to determine if the nonconforming condition has rendered any TS SSC inoperable. When system capability is degraded to a point in which it cannot perform with reasonable expectation or reliability, the system should be judged inoperable, even if the system could provide the specified safety function at this instantaneous point in time.

## **BACKFIT DISCUSSION**

This RIS provides information concerning the NRC staff position on the relationship between Appendix A to 10 CFR Part 50 and 10 CFR 50.36 so that the stakeholders may understand the requirements of the regulations more broadly. This RIS is identical to earlier NRC positions on the relationship of the GDC and the TS and, therefore, is not a backfit under 10 CFR 50.109, “Backfitting.” Consequently, the NRC staff did not perform a backfit analysis.

## **FEDERAL REGISTER NOTIFICATION**

[Discussion to be provided in final RIS]

## **CONGRESSIONAL REVIEW ACT**

[Discussion to be provided in final RIS]

## **PAPERWORK REDUCTION ACT STATEMENT**

This RIS does not contain any new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing collection requirements under 10 CFR Part 50 were approved by the Office of Management and Budget, control number 3150-0011.

## **PUBLIC PROTECTION NOTIFICATION**

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## **CONTACT**

Please direct any questions about this matter to the technical contact listed below.

Laura A. Dudes, Director  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Timothy J. McGinty, Director  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Technical Contact: Carl S. Schulten, NRR/DSS  
301-415-1192  
[carl.schulten@nrc.gov](mailto:carl.schulten@nrc.gov)

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