OMB Control No.: 3150-0011

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

August 24, 2006

NRC REGULATORY ISSUE SUMMARY 2006-17
NRC STAFF POSITION ON THE REQUIREMENTS OF 10 CFR 50.36, "TECHNICAL SPECIFICATIONS," REGARDING LIMITING SAFETY SYSTEM SETTINGS DURING PERIODIC TESTING AND CALIBRATION OF INSTRUMENT CHANNELS

ADDRESSEES

All holders of operating licenses for nuclear power reactors, except those who 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) on the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical Specifications," with respect to limiting safety system settings (LSSSs) assessed during periodic testing and calibration of instrumentation. This RIS discusses issues that could occur during testing of LSSSs and which, therefore, may have an adverse effect on equipment operability. This RIS also presents an approach, found acceptable to the NRC staff, for addressing these issues for use in licensing actions that require prior NRC staff approval. Methods and approaches different from those in this RIS may also be acceptable to the NRC staff. The approach presented in this RIS is intended for use by licensees in developing content for license amendment applications. This RIS requires no action or written response from addressees.

BACKGROUND INFORMATION

Over the past several years during public meetings and as part of license amendments, the NRC staff has been discussing its perspective on the efficacy of using technical specification (TS) allowable values to meet the requirements of 10 CFR 50.36(c)(1)(ii)(A) for LSSSs. The industry Technical Specifications Task Force (TSTF) submitted its recommendations for standard technical specifications (STS) changes as TSTF-493, Revision 0, "Clarify Application of Setpoint Methodology for LSSS Functions" on January 27, 2006, for NRC staff review. TSTF-493 was intended to address seven concepts proposed by industry for developing model content for TSs and TSs Bases for LSSSs instrumentation functions. TSTF-493 was provided as a readily adoptable approach to ensure that the TSs conform to the requirements of 10 CFR 50.36. The background information that follows cites regulations, identifies guidance documents, and

defines terms important to understanding this RIS. The information also provides discussion of the relationship between the STSs and TSTF-493, Revision 0 to set the framework for the Summary of the Issue that follows.

Regulations and guidance documents

The requirements for plant TSs are stated in 10 CFR 50.36, "Technical Specifications":

- Section 50.36(a) states: "Each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section."

- Section 50.36(c)(1)(i)(A) states: "Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity."

- Section 50.36(c)(1)(ii)(A) states: "Limiting safety system settings for nuclear reactors are 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. If, during operation, it is determined that the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor."

- Section 50.36(c)(3) states: "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," describes a method acceptable to the NRC staff for complying with the NRC's regulations for ensuring that setpoints for safety-related instrumentation are initially within and remain within the TS limits. The RG endorses Part I of ISA -S67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation," subject to NRC staff clarifications. Part I defines a framework for ensuring that setpoints for nuclear safety-related instrumentation are established and maintained within specified limits. The RG does not address or endorse Part II of ISA-S67.04-1994, "Methodologies for the Determination of Setpoints for the Nuclear Safety-Related Instrumentation." Part II provides recommended practices and guidance for implementing Part I.

For the purpose of this RIS, the NRC staff is providing the following definitions of *limiting trip setpoint*, *nominal trip setpoint,* and *allowable value*:

> Limiting trip setpoint (LSP)
> The LSP is the limiting setting for the channel trip setpoint (TSP) considering all credible instrument errors associated with the instrument channel.

The LSP is the limiting value to which the channel must be reset at the conclusion of periodic testing to ensure the safety limit (SL) will not be exceeded if a design basis event occurs before

the next periodic surveillance or calibration.

Nominal trip setpoint (NSP)
The NSP is the TSP value selected by the licensee for plant operations.

The NSP must be equal to or more conservative than the LSP.

Allowable value (AV)
An AV is a limiting value of an instrument's as-found trip setting used during surveillances.

Technical Specifications: Limiting Trip Setpoints and Resetting Requirements

Many licensees use an AV as as-found LSSSs. This means that licensees perform periodic surveillances and use the AV to verify that the SL is protected and that the channel is operable. If the AV is exceeded during a surveillance, the instrument is declared inoperable because there is not adequate assurance that the instrument will perform its safety function, and appropriate TS-required action must be taken.

10 CFR 50.36(c)(1)(ii)(A) requires that the TSs include LSSSs for variables that have significant safety functions. For variables on which a SL has been placed, the LSSS must be chosen to initiate automatic protective action to correct abnormal situations before the SL is exceeded. Many licensees have TSs that specify an AV as the LSSSs. During periodic surveillances, no actions are required by TSs (e.g., resetting) as long as the results indicate that the as-found TSP is conservative with respect to the AV. Many licensees rely on administrative controls to reset the instrument TSP to the LSP or to a value more conservative than LSP at the conclusion of periodic testing, but these controls are given in documents other than the TSs. However, if the instrument TSP is not left at a value that is conservative with respect to the LSP, then there may not be assurance that the SL will be protected until the next periodic surveillance because instrument drift and other changes in setpoint can occur. These uncertainties are accounted for in the calculation of the LSP. It is the NRC staff's position that the LSP protects the SL.

Technical Specifications: Automatic Safety Systems Function to Protect the SL

In addition, 10 CFR 50.36(c)(1)(ii)(A) requires a licensee to take appropriate action if it is determined that the automatic safety system does not function as required to protect the SL. If the channel is set to a NSP that is more conservative than the LSP then abnormally large changes in the setpoint have to occur between surveillance test intervals to indicate the channel is malfunctioning. Such setpoint changes may not exceed the AV because of the added conservatism between the LSP and the NSP. Under these conditions, operators consulting the TSs might conclude that the instrument is operable because the as-found TSP is more conservative than the AV, even though the instrument is not functioning as predicted by the instrument setpoint methodology and may not be capable of protecting the SL.

As one measure of instrument operability, the NRC staff expects licensees to verify during testing or calibration that the change in the measured TSP since the last test or calibration is within predefined limits (double-sided acceptance criteria band) and to take appropriate actions if the change is outside these limits. The acceptance criteria band should be derived from the licensee's setpoint methodology, including use of generic or plant-specific data. If the as-found TSP exceeds the AV in TSs the channel is inoperable and the associated action requirements are followed. If the change in the measured TSP exceeds the predefined limits but the

measured TSP is conservative with respect to the AV, and the licensee determines during the surveillance that the instrument channel is functioning as expected and can reset the channel to within the setting tolerance (amount by which as-left setting value is permitted to differ from NSP) of the NSP, then the licensee may restore the channel to service and the condition is entered into the licensee's corrective action program for further evaluation. However, if during the surveillance the change in the measured TSP exceeds the predefined limits and the licensee cannot determine that the instrument channel is functioning as required, then the instrument is declared inoperable and the associated TS actions are followed. It is NRC staff's position that verifying that the as-found TSP is within the acceptance band limits during test or calibration is part of the determination that an instrument is functioning as required.

10 CFR 50.36(c)(1)(ii)(A) also contains requirements for a general class of LSSSs; LSSSs related to variables having significant safety functions but which do not protect SLs. All plant operating licenses have TSs for LSSSs that are not related to SLs. For these LSSSs, 10 CFR 50.36(c)(1)(ii)(A) also requires that a licensee take appropriate action if it is determined that the automatic safety system does not function as required. Additionally, 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," requires safety-related structures, systems, and components must also perform satisfactorily in service, i.e, the settings must initiate automatic protective actions consistent with the design basis. Following surveillance testing, resetting the TSP to within the setting tolerance of the LSP or to a value more conservative than the LSP would ensure that LSSSs for instrument functions not related to SLs perform their specified safety functions. Additionally, when evaluating the as-found TSP, operability should be determined based on the plant-specific setpoint methodology, (including consideration of the expected uncertainties in the instrument setpoint determination) to ensure that automatic protective devices will perform their specified safety function. The NRC staff recognizes that other methods and approaches different from those described above may also be acceptable and would be evaluated on a plant-specific basis.

SUMMARY OF THE ISSUE

Standard Technical Specifications

The TSTF-493, Revision 0 traveler submitted by industry addressed many of the 10 CFR 50.36 requirements identified above. However, although the TSTF discussed a plant-specific process for identifying the LSSSs instrument functions, it did not provide a list of functions that would resolve the issues for most plants. The NRC staff believes that a generic list of functions is needed in the final TSTF to avoid significant resources being expended by both industry and NRC as part of plant-specific reviews.

In accordance with 10 CFR 50.36(c)(1)(ii)(A), the following guidance is provided for identifying a list of functions to be included in TS as the subset of LSSSs specified for variables on which SLs have been placed. The SLs are those limits defined in STS Section 2.1.1, Reactor Core SLs and 2.1.2, Reactor Coolant System Pressure SLs. This subset includes automatic protective devices in TSs for specified variables on which SLs have been placed that: (1) initiate a reactor trip; or (2) actuate safety systems. As such these variables provide protection against violating reactor core safety limits, or reactor coolant system pressure safety limits. The NRC staff notes that these generic criteria represent one method the NRC staff would find acceptable for identifying LSSSs in its reviews of plant-specific license amendments. If licensees make submittals which do not follow this guidance, they should provide a plant-specific analysis to

justify excluding instrument functions within these criteria.

Additionally, the TSTF did not sufficiently address the NRC staff concern with the practice of using NSPs for establishing the test acceptance criteria band for as-found instrument values. The NRC staff concern was that excessive changes in the TSP could go undetected and also that a high incidence of false detections could result from such a practice. Subsequently, the NRC staff investigated the acceptability of basing operability determinations for as-found instrument values on NSP values. The NRC staff review concluded that if specific conditions are met, then the NRC staff would find a NSP-based assessment of as-found values acceptable. Those conditions are: (1) the setting tolerance band is less than or equal to the square root of the sum of the squares of reference accuracy, measurement and test equipment, and readability uncertainties; (2) the setting tolerance is included in the total loop uncertainty, and (3) the pre-defined test acceptance criteria band for the as-found value includes either, the setting tolerance or the uncertainties associated with the setting tolerance band, but not both of these.

The NRC staff intends to incorporate this setpoint issue guidance in the final approved TSTF. The NRC staff believes that this will establish a uniform, satisfactory resolution that addresses the industry's and the staff's concerns with instrument settings, conforms to Inspection Manual Chapter Part 9900 guidance, "Operability Determinations & Functionality Assessments for Resolution of Degraded and Nonconforming Conditions Adverse to Quality or Safety" (RIS 2005-20), and ensure compliance with 10 CFR 50.36. The NRC staff intends to issue TSTF-493 as a consolidated line item improvement process (CLIIP). The CLIIP package will include a model application and safety evaluation to support using TSTF-493 for plant-specific license amendment applications.

The NRC staff believes that for current plant operation, addressing these instrument setpoint issues is not an immediate safety issue since most plant procedures require reset of instruments. In the case where an instrument channel has deviated from its trip setpoint by a small amount a reactor trip and safety system actuation would still occur. Finally, diverse instrumentation for reactor trip and the actuation of safety systems exist and are expected to function. In addition, most licensees assure operability of instrument channels when they periodically compare the as-found setpoint value during periodic surveillances with a predetermined value other than the AV of the TS, and adjust the instrument channel to within a calibration tolerance band. If the trip setpoint exceeds this predetermined value, licensees take corrective actions per plant procedures.

BACKFIT DISCUSSION

This RIS presents generic criteria that represents one method the NRC staff would find acceptable for identifying LSSSs in its reviews of plant-specific license amendments. This RIS requires no action or written response and, therefore, is not a backfit under 10 CFR 50.109. Consequently, the NRC staff did not perform a backfit analysis.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment on this RIS was not published in the *Federal Register* because it is informational and does not depart from current regulatory requirements and practices. NRC intends to work with the Nuclear Energy Institute, industry representatives, members of the public, and other stakeholders in developing final guidance and revising related guidance documents.

CONGRESSIONAL REVIEW ACT

The NRC has determined that this action is a rule subject to the Congressional Review Act. Office of Management and Budget (OMB) has determined this is a minor rule.

PAPERWORK REDUCTION ACT STATEMENT

This RIS contains information collection requirements that are subject to the requirements of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the OMB, approval number 3150-0011, which expires February 28, 2007.

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

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