U.S. NUCLEAR REGULATORY COMMISSION

DRAFT REGULATORY GUIDE DG-1363

Proposed Revision 4 to Regulatory Guide 1.105

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SETPOINTS FOR SAFETY-RELATED INSTRUMENTATION

A. INTRODUCTION

Purpose

This regulatory guide (RG) describes an approach that is acceptable to the staff of the U.S. Nuclear Regulatory Commission (NRC) to meet regulatory requirements to ensure that: a) setpoints for safety-related instrumentation are established to protect nuclear power plant safety and analytical limits, and b) the maintenance of instrument channels implementing these setpoints ensures they are functioning as required, consistent with the plant technical specifications. This RG endorses American National Standards Institute (ANSI)/International Society of Automation (ISA) Standard 67.04.01-2018, "Setpoints for Nuclear Safety-Related Instrumentation" (Ref. 1).

Applicability

This RG applies to licensees and applicants subject to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," (Ref. 2) and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" (Ref. 3).

Applicable Regulations

- 10 CFR Part 50 provides regulations for licensing production and utilization facilities and requires applicants and licensees to determine limiting safety system settings (LSSS) as follows:
    - 10 CFR 50.36(c)(1)(ii)(A) states that limiting safety system settings are settings for automatic protective devices related to those variables having significant safety functions. This clause requires that where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective action will correct the abnormal situation before a safety limit is exceeded. It also requires that the licensee notify the NRC if the licensee determines that an automatic safety system does not function as required. The licensee is then required to review the matter and record the results of the review.
- The General Design Criteria (GDC) in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 establish minimum requirements for the principal design criteria for

This RG is being issued in draft form to involve the public in the development of regulatory guidance in this area. It has not received final staff review or approval and does not represent an NRC final staff position. Public comments are being solicited on this DG and its associated regulatory analysis. Comments should be accompanied by appropriate supporting data. Comments may be submitted through the Federal rulemaking Web site, http://www.regulations.gov, by searching for draft regulatory guide DG-1363. Alternatively, comments may be submitted to the Office of Administration, Mailstop: TWFN 7A-06M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Program Management, Announcements and Editing Staff. Comments must be submitted by the date indicated in the *Federal Register* notice.

Electronic copies of this DG, previous versions of DGs, and other recently issued guides are available through the NRC's public Web site under the Regulatory Guides document collection of the NRC Library at https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/. The DG is also available through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under Accession No. ML20055G823. The regulatory analysis may be found in ADAMS under Accession No. ML20055G824.

water-cooled nuclear power plants.. The General Design Criteria are also considered to be generally applicable to other types of nuclear power units and are intended to provide guidance in establishing the principal design criteria for such other units. The following GDC are of importance to setpoints for safety-related instrumentation of nuclear power plants:

- GDC 13, "Instrumentation and Control," requires operating reactor licensees to provide instrumentation to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety.

- GDC 20, "Protection System Functions," requires, among other things, that the protection system be designed to initiate operation of appropriate systems to ensure that specified acceptable fuel design limits are not exceeded.

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 requires, in part, that licensees have programs and administrative controls in place that are intended to ensure that safety-related structures, systems, and components perform as designed..

- 10 CFR Part 52 governs the issuance of early site permits, standard design certifications, combined licenses, standard design approvals, and manufacturing licenses for nuclear power facilities.

  - 10 CFR 52.47, "Contents of applications; technical information," contains the application requirements cited above for standard design certifications issued under 10 CFR Part 52. In particular, 10 CFR 52.47(a)(11) references 10 CFR 50.36, "Technical specifications," 10 CFR 52.47(a)(3)(i) references the GDC (Appendix A to 10 CFR Part 50), and 10 CFR 52.47(a)(19) references Appendix B to 10 CFR Part 50.

- 10 CFR 50.55a(h) states that protection systems of nuclear power reactors of all types must meet the requirements specified in 10 CFR 50.55a(h), and each combined license for a utilization facility is subject to the conditions in 10 CFR 50.55a(h).

  - In 10 CFR 50.55a(h), the NRC incorporates by reference Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1968, "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems," (Ref. 4) Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," (Ref. 5) and IEEE Standard 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," (including the correction sheet dated January 30, 1995) (Ref. 6) and applies one of them to nuclear power plants on the basis of the plant licensing date or other criteria. Clauses 3(6) and 4.1 of IEEE 279-1971 require the determination and documentation of setpoints for protective actions. Clause 6.8 of IEEE 603-1991 requires that the allowance for uncertainties associated with a setpoint be established in accordance with a documented methodology.

Related Guidance

- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Chapter 7, "Instrumentation and Controls," Branch Technical Position 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints," (Ref. 7) provides guidelines for the NRC staff's review of the process an applicant or licensee uses to establish and maintain instrument setpoints.

- Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals To Accommodate a 24-Month Fuel Cycle," dated April 2, 1991 (Ref. 8) provides guidance on acceptable methods for licensees to justify an increase in calibration surveillance intervals using as-found and as-left calibration data from past calibration surveillances.

- Regulatory Issue Summary (RIS) 2006-017, "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," dated August 24, 2006 (Ref. 9) provides regulatory clarification on NRC staff positions in terms of the appropriate determination of technical specification-related instrument channel operability. The RIS clarifies staff positions about the appropriate establishment of as-found and as-left acceptance tolerances.

- Technical Specification Task Force (TSTF) Traveler TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions," dated May 11, 2010 (Ref. 10) provides guidance about the maintenance of instrument setpoints during periodic surveillances.

Purpose of Regulatory Guides

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This RG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Parts 50 and 52 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et. seq.). These information collections were approved by the Office of Management and Budget (OMB), approval numbers 3150-0011 and 3150-0151. Send comments regarding this information collection to the FOIA, Library, and Information Collections Branch (T-6A10), U.S. Nuclear Regulatory Commission, Washington, DC 20555 0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0011 and 3150-0151), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street, NW Washington, DC 20503; e-mail: oira_submission@omb.eop.gov.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

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B. DISCUSSION

1. Reason for Revision

This revision of RG 1.105 describes a method that is acceptable to the staff for use in complying with the agency's regulations to ensure that: a) setpoints for safety-related instrumentation are established to protect plant safety and analytical limits, and b) the maintenance of instrument channels implementing these setpoints ensures they are functioning as required, consistent with the plant technical specifications. This revision endorses ANSI/ISA S67.04-2018, which provides a basis for establishing setpoints for nuclear instrumentation for safety systems.

2. Background

2.1 Introduction

Safety analyses and design bases for systems and components used in a nuclear power plant demonstrate or provide reasonable assurance that safety limits will be adequately protected under normal and anticipated conditions. Safety analyses and design bases include assumptions that important protective actions will be initiated when key process parameters exceed preanalyzed limits. It is important that those analyses and design bases adequately bound both actual plant conditions and actual equipment operation; otherwise, the conclusions of the safety analyses might not be valid, or the protection intended by the design bases might not be attained.

The ability of plant safety systems to achieve their required functional performance depends, in part, on proper selection of instrument setpoints. Therefore, assumptions contained within the analyses concerning the capabilities of instrumentation equipment to achieve required setpoints and other aspects of instrument operation should be verified through setpoint analyses to ensure the conclusions of the safety analyses bound the actual operation of the safety-related instrument channels. Also, licensees should monitor the performance of safety-related instrument channels to ensure that the instrument channel performance during operations is consistent with those assumptions. This RG provides guidance to address both the selection of appropriate setpoints and the determination of anticipated limits of setpoint deviation.

Lack of adequate allowance for instrument setpoint uncertainty due to drift or the effects of variations in process or ambient conditions has led to operational problems. Past operating experience has indicated that the established setpoints for safety-related instrumentation may also have enabled licensees to operate plants outside the allowable values for the limiting conditions of operation (LCOs) defined in the plant technical specifications. After the establishment of formal setpoint evaluation programs to address this concern, licensees discovered conflicts between the calibration setpoints implemented within the plant calibration procedures and the results of formal engineering calculations used to account for instrument channel uncertainties when establishing appropriate setpoints. These setpoint discrepancies were partially associated with industry practices that led to errors in defining appropriate instrument channel performance test acceptance criteria within calibration and surveillance procedures and a lack of understanding of the relationship of the as-found trip setpoint to the plant technical specification allowable values.

2.2 Technical Issues Addressed by ANSI/ISA 67.04.01-2018

2.2.1 *Technical Specification Allowable Values*

Historically, the allowable values in many older plant technical specifications were established without the benefit of a consistent, formal analysis of expected instrument channel performance that accounts for all expected performance uncertainties. RIS 2006-17 and TSTF-493, Revision 4, address this concern by identifying the as-found tolerance (AFT) limit as a benchmark for assessing instrument channel operability, rather than an allowable value. RIS 2006-17 states that if the as-found setpoint measured during a surveillance is outside predefined limits (double-sided acceptance criteria band), the instrument channel equipment being tested shall be immediately evaluated to determine whether the channel is functioning as expected for operability before returning it to service. If it is found to be not operable, then the licensee should take appropriate action as required by the plant corrective action program and/or the plant technical specifications.

Sections 3, 4.5.5, and 4.6 of ANSI/ISA 67.04.01-2018 provide definitions that the NRC staff finds useful for establishing and accounting for AFT and as-left tolerance (ALT) when performing setpoint analyses, as well as acceptance criteria that the staff finds useful for performing technical specification-required surveillances. The definitions and use of these concepts are consistent with staff positions on the use of AFT and ALT presented in NRC RIS 2006-17 and TSTF-493, Revision 4.

Under 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," a licensee may submit a license amendment request (LAR) that revises its technical specifications to implement a setpoint control program, as described in TSTF-493, Revision 4, Option B. Once the NRC staff approves the setpoint control program in the LAR, the program would allow for controlling the setpoint values outside of the technical specifications. The setpoint control program would ensure instrumentation will function as required and provide the licensee flexibility to revise setpoints without requiring a license amendment. The setpoint control program should implement a setpoint calculation methodology that the NRC has reviewed and accepted specifically for that purpose. This RG provides guidance that the staff considers appropriate for such a methodology.

2.2.2 *Adequacy of the Allowance for Channel Uncertainties between the Limiting Trip Setpoint and the Analytical Limit*

Limiting trip setpoints should allow for instrument channel performance uncertainties. In prior revisions, ANSI/ISA 67.04.01 described estimating the instrument channel total loop uncertainty by combining random and bias uncertainties. However, these prior revisions did not provide acceptance criteria for establishing the appropriate magnitude of estimates for individual random uncertainties. In the 2018 revision of the standard, Section 4.4(i) states, "The uncertainty tolerance interval for random, independent uncertainty terms shall be estimated using statistical and bounding methods such that the tolerance interval estimate bounds the uncertainty of interest with a 95-percent probability, at a 95-percent confidence level." In addition, Section 4.4(i) states, "Approaches for determining the tolerance interval may vary, based on the type of distribution and will generally consider the sample size and standard deviation of the sample population to obtain the desired probability and confidence levels."

The 2018 revision also provides guidance for cases in which the sample population is not large enough to support a usable statistical estimate at the 95/95 tolerance interval. In such cases, the licensee should determine a bounding uncertainty term and document the basis for determining this term. The licensee can use this bounding value as a 95/95 tolerance interval term in the uncertainty analysis.

According to ANSI/ISA 67.04.01-2018, the uncertainty terms contributing to the estimate of total instrument channel random uncertainties can be made up of deterministic, statistical, or bounding estimate terms. The revised standard also states that the individual random uncertainty tolerance interval terms are combined at the same number of standard deviations and that the result of the combination represents a value of the random uncertainty performance of the instrument channel at a 95-percent probability at a 95-percent confidence level. In addition, uncertainty terms that are dependent, not random, or not normally distributed may be added using algebraic or other statistically appropriate methods. The total instrument channel uncertainty includes the algebraic combination of the total of the resulting estimate of random uncertainties and the estimate of nonrandom uncertainties. Section 4.5.3 of ANSI/ISA 67.04.01-2018 provides a recommended method of combining all instrument channel uncertainties.

2.2.3 *Evaluation of the Allowance for Drift*

The 1994 revision of ANSI/ISA S67.04 provided limited guidance on drift evaluations and uncertainty term development for the evaluation of an instrument surveillance interval. The NRC staff has generally accepted drift evaluations based on statistical prediction techniques. Historically, the NRC staff and external stakeholders have had discussions regarding how to appropriately account for drift that occurs over multiple increments of vendor-specified drift estimates (e.g., a transmitter vendor drift specification of 0.25 percent of calibrated span per 6 months but the instrument is expected to be in continual service for 24 months between calibrations). These discussions considered whether the estimate of total drift that occurs between successive surveillances should be estimated through linear extrapolation of the vendor specification or whether multiple increments of vendor drift specifications should be combined using the square root of the sum-of-the-squares method. ANSI/ISA 67.04.01-2018 has updated Section 4.6 to include methods on considering uncertainties resulting from performance monitoring with respect to the effects of instrument drift and other abnormal equipment performance on AFTs. As described in the footnote in Section 4.6 of the standard, when determining the magnitude of drift to be included when establishing the AFT, licensees should estimate on the low side so as not to potentially mask the ability to detect a degrading instrument during a required surveillance. In addition, when establishing an appropriate allowance for total loop uncertainty between the analytical limit and the limiting trip setpoint, licensees should estimate drift on the high side so as to ensure adequate margin for instrument channel performance in achieving the safety objectives.

2.2.4 *Definition of Terms*

ANSI/ISA 67.04.01-2018 introduces additional definitions. These definitions include AFT, ALT, allowable value, limiting trip setpoint, measuring and test equipment, measuring and test equipment uncertainty, nominal trip setpoint, setting tolerance, tolerance interval, tolerance limit, and total loop uncertainty. These definitions are consistent with the NRC staff's understanding of these terms.

2.2.5 *Illustrative Figure Depicting Relationship of Terms*

Figure 1 of ANSI/ISA 67.04.01-2018 illustrates setpoint relationships for nuclear safety-related setpoints. The figure denotes relative position and not direction, and depicts uncertainty relationships that do not represent any particular direction, combination, or relationship of uncertainty groupings for the development of a trip setpoint or allowable value. This figure has been updated from the 1994 and 2006 revisions of the standard to illustrate relationships among the limiting and nominal trip setpoints, the analytical limit, and the safety limit. It also illustrates the relationship among the nominal setpoint and the AFT and ALT limits. The revised figure no longer depicts a relationship between the nominal setpoint and the technical specification allowable value, and expanded content within Section 4.6 (Performance Acceptance Criteria) of ANSI/ISA 67.04.01-2018 addresses the concerns in RIS 2006-17.

2.2.6 *Graded Approach Based on Safety Significance*

Since 1994, Section 4 of ANSI/ISA S67.04.01 has stated that the safety significance of various types of setpoints for safety-related instrumentation may differ and a less rigorous setpoint determination method may be applied for certain functional units and LCOs. The NRC staff has not identified a specific position on the appropriate technical methodology to be used when establishing setpoints for nonlimiting safety system setting-related instrument channels.

2.2.7 *Measurement and Test Equipment Uncertainties*

Section 4.4 of ANSI/ISA 67.04.01-2018 provides for the accounting of measurement and test equipment uncertainties but does not specifically identify acceptance criteria. Additional information for determining measurement and test equipment uncertainty may be found in the ISA recommended practice document ISA-RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation" (Ref. 11). The NRC staff does not endorse any version of ISA-RP67.04.02, however, the staff believes those versions contain useful information.

2.2.8 *ISA Recommended Practice ISA-RP67.04.02*

Section 4.4 of ANSI/ISA 67.04.01-2018 identifies that additional information for determining total loop uncertainty may be found in ISA-RP67.04.02-2010. The NRC staff does not endorse any version of ISA-RP67.04.02, however, the staff believes those versions contain useful information.

3. Harmonization with International Standards

The International Atomic Energy Agency (IAEA) works with member states and other partners to promote the safe, secure, and peaceful use of nuclear technologies. The IAEA develops safety standards for protecting people and the environment from harmful effects of ionizing radiation. The NRC staff reviewed guidance from the IAEA and the International Organization for Standardization. Clauses 6.205 through 6.212 of IAEA Specific Safety Guide SSG-39-2016, "Design of Instrumentation and Control Systems for Nuclear Power Plants," (Ref. 12) and International Electrotechnical Commission (IEC) Standard 61888, "Nuclear power plants—Instrumentation important to safety—Determination and maintenance of trip setpoints," issued 2002 (Ref. 13) present guidance like that found in earlier versions of ANSI/ISA 67.04.01. However, these documents are less rigorous than ANSI/ISA 67.04.01-2018. SSG-39-2016 and IEC 61888 provide useful additional information as a technical reference. However, the staff does not endorse these documents.

4. Documents Discussed in Staff Regulatory Guidance

This RG endorses the use of one or more codes or standards developed by external organizations, and other third-party guidance documents. These codes, standards and third-party guidance documents may contain references to other codes, standards or third-party guidance documents ("secondary references"). If a secondary reference has itself been incorporated by reference into NRC regulations as a requirement, then licensees and applicants must comply with that standard as set forth in the regulation. If the secondary reference has been endorsed in a RG as an acceptable approach for meeting an NRC requirement, then the standard constitutes a method acceptable to the NRC staff for meeting that regulatory requirement as described in the specific RG. If the secondary reference has neither been incorporated by reference into NRC regulations nor endorsed in a RG, then the secondary reference is neither a legally-binding requirement nor a "generic" NRC approved acceptable approach for meeting an NRC requirement. However, licensees and applicants may consider and use the information in the

secondary reference, if appropriately justified, consistent with current regulatory practice, and consistent with applicable NRC requirements.

C. STAFF REGULATORY GUIDANCE

1. The staff endorses ANSI/ISA 67.04.01-2018 as a method acceptable to the NRC staff for use in complying with the agency's regulations to ensure that: a) setpoints for safety-related instrumentation are established to protect nuclear power plant safety and analytical limits, and b) the maintenance of instrument channels implementing these setpoints ensures they are functioning as required, consistent with the plant technical specifications.

D. IMPLEMENTATION

The NRC staff may use this regulatory guide as a reference in its regulatory processes, such as licensing, inspection, or enforcement. However, the NRC staff does not intend to use the guidance in this regulatory guide to support NRC staff actions in a manner that would constitute backfitting as that term is defined in 10 CFR 50.109, "Backfitting," and as described in NRC Management Directive 8.4, "Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests," (Ref. 14) nor does the NRC staff intend to use the guidance to affect the issue finality of an approval under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." The staff also does not intend to use the guidance to support NRC staff actions in a manner that constitutes forward fitting as that term is defined and described in Management Directive 8.4. If a licensee believes that the NRC is using this regulatory guide in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfitting or forward fitting appeal with the NRC in accordance with the process in Management Directive 8.4.

REFERENCES [1]

1. American National Standards Institute (ANSI)/International Society of Automation (ISA), Standard 67.04.01-2018, "Setpoints for Nuclear Safety-Related Instrumentation," ISA, Research Triangle Park, NC, 2018.

2. *U.S. Code of Federal Regulations* (CFR), "Domestic Licensing of Production and Utilization Facilities," Part 50, Chapter 1, Title 10, "Energy."

3. CFR, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Part 52, Chapter 1, Title 10, "Energy."

4. Institute of Electrical and Electronics Engineers (IEEE), Standard 279-1968, "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems," Piscataway, NJ, 1968.

5. IEEE, Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," Piscataway, NJ, 1971.[2]

6. IEEE, Standard 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations" (including the correction sheet dated January 30, 1995), Piscataway, NJ, 1995.

7. U.S. Nuclear Regulatory Commission (NRC), NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Chapter 7, "Instrumentation and Controls," Branch Technical Position 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints," Washington, DC.

8. NRC, Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," Washington DC, April 2, 1991. (ADAMS Accession No. ML031140501)

9. NRC, Regulatory Issue Summary 2006-017, "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," Washington, DC, August 24, 2006. (ADAMS Accession No. ML051810077)

10. NRC, Technical Specifications Task Force (TSTF) Traveler TSTF-493, "Clarify Application of Setpoint Methodology for Limiting Safety System Settings," Washington, DC. The NRC "Notice of Availability" for TSTF-493, Revision 4, Errata was issued on May 11, 2010, in the *Federal Register* (75 FR 26294) (ADAMS at Accession No. ML093410581)

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1 Publicly available NRC published documents are available electronically through the NRC Library on the NRC's public Web site at http://www.nrc.gov/reading-rm/doc-collections/ and through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html. The documents can also be viewed online or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD. For problems with ADAMS, contact the PDR staff at 301-415-4737 or (800) 397-4209; fax (301) 415-3548; or e-mail pdr.resource@nrc.gov.

2 Copies of Institute of Electrical and Electronics Engineers (IEEE) documents may be purchased from the IEEE Services Center, 455 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855 or IEEE's Web site at http://www.ieee.org.publications_standards/index.

11. ISA, ISA-RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," Research Triangle Park, NC, 2010.

12. International Atomic Energy Agency (IAEA) Specific Safety Guide SSG-39-2016, "Design of Instrumentation and Control Systems for Nuclear Power Plants," Vienna, Austria, 2014.[3]

13. International Electrotechnical Commission, Standard 61888, "Nuclear power plants—Instrumentation important to safety—Determination and maintenance of trip setpoints," Revision 1, Geneva, Switzerland, 2002.[4]

14. NRC, Management Directive 8.4, "Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests," Washington DC, September 20, 2019.

3 Copies of International Atomic Energy Agency (IAEA) documents may be obtained through their Web site: WWW.IAEA.Org/ or by writing the International Atomic Energy Agency, P.O. Box 100 Wagramer Strasse 5, A-1400 Vienna, Austria.

4 Copies of International Electrical Commission (IEC) documents may be obtained through their Web site http://www.iec.ch/, by writing the IEC Central Office at 3 rue de Varembé, 1st Floor, PO Box 131, CH-1211 Geneva 20, Switzerland, by telephone +41 22 919 02 11, or by fax +41 22 919 0300.