

RULEMAKING ISSUE Notation Vote

August 24, 2015

SECY-15-0106

FOR: The Commissioners

FROM: Mark A. Satorius
Executive Director for Operations

SUBJECT: PROPOSED RULE: INCORPORATION BY REFERENCE OF INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS STANDARD 603-2009, "IEEE STANDARD CRITERIA FOR SAFETY SYSTEMS FOR NUCLEAR POWER GENERATING STATIONS" (RIN 3150-A198)

PURPOSE:

To obtain Commission approval to publish for public comment a proposed rule that would incorporate by reference a voluntary consensus standard for protection systems and safety systems in nuclear power plants into Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, "Codes and standards."

BACKGROUND:

It has been the practice of the U.S. Nuclear Regulatory Commission (NRC) to establish requirements for the protection systems and safety systems in nuclear power plants by incorporating by reference in the NRC's regulations certain standards published by the Institute of Electrical and Electronics Engineers (IEEE), a standards developing organization. Upon incorporation by reference of an IEEE standard, the provisions of the standard are legally binding NRC requirements as delineated in 10 CFR 50.55a and subject to the conditions that are set forth in 10 CFR 50.55a. The IEEE Std 603-1991, "IEEE Standard Criteria for Safety

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Systems for Nuclear Power Generating Stations,” was incorporated by reference into 10 CFR 50.55a(h) in a final rule dated April 13, 1999 (64 FR 17944). The IEEE has since revised IEEE Std 603-1991 by publishing IEEE Std 603-2009. This proposed rule would update the regulations to incorporate by reference IEEE Std 603-2009 and the correction sheet dated March 10, 2015. This action would be consistent with the provisions of the National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, which encourage Federal regulatory agencies to consider adopting voluntary consensus standards as an alternative to independently developing unique government standards. This action also would be consistent with NRC’s practice to evaluate the latest version of a consensus standard for its suitability for endorsement by regulation or regulatory guidance.

DISCUSSION:

The staff has prepared a proposed rule (Enclosure 1) that would revise the NRC’s regulations in 10 CFR 50.55a, “Codes and standards,” to incorporate by reference IEEE Std 603-2009 and the correction sheet dated March 10, 2015. This proposed rule would affect primarily applicants for new reactor designs (including applicants for a construction permit, operating license, design approval, design certification, combined license, and manufacturing license) who submit applications after the effective date of the final rule. Potentially, the rule may also affect licensees of currently operating nuclear power plants as well as current holders of combined licenses who apply for a license amendment after the effective date of the final rule.

IEEE Std 603-2009

In adopting IEEE Std 603-2009, the IEEE departed from the approach in IEEE Std 603-1991 in many respects. For example, IEEE Std 603-2009 now does the following:

- 1) addresses potential safety issues that might arise from incorporating components that use advanced technologies into safety systems
- 2) contains additional and updated references and does not include references that are no longer in effect
- 3) provides guidance to address electromagnetic compatibility issues
- 4) clarifies the difference between the terms “single failure” and “common cause failure” as used in the standard
- 5) references IEEE Std. 7-4.3.2 for safety system equipment employing digital computers and programs or firmware
- 6) contains classification requirements for equipment not credited to perform a safety function but is connected to safety-related equipment

The staff considers these substantive changes (and others) to be considerable safety improvements over the criteria in IEEE Std 603-1991.

To avoid backfitting and issue finality issues, the proposed rule proposes to continue the incorporation by reference of IEEE Std 603-1991 for existing nuclear power plant designs including those existing design certification rules which were approved to IEEE Std 603-1991. However, licensees that voluntarily choose to modify or replace safety systems or protection systems would be required to comply with IEEE Std 603-2009 and the correction sheet dated March 10, 2015, subject to the conditions in § 50.55a(h)(3) through (8).

Implementing Guidance

The NRC is simultaneously issuing a draft regulatory guide (DG-1251, "Criteria for the Power, Instrumentation, and Control Portions of Safety Systems for Nuclear Power Plants") with this proposed rule for public comment (Enclosure 2). The draft regulatory guide provides guidance for complying with the proposed revisions to the rule for satisfying the NRC's regulations.

Regulatory Analysis

The staff prepared a draft regulatory analysis (Enclosure 3) to determine the expected quantitative costs and benefits of the proposed rule. In addition to these quantitative factors, the draft regulatory analysis qualitatively considered factors including regulatory efficiency and consistency with the National Technology Transfer and Advancement Act of 1995 which directs Federal agencies to adopt voluntary consensus standards whenever possible. If the quantified costs and benefits were considered in isolation, the NRC would not proceed with this rulemaking because the total quantified benefits of the proposed regulatory action do not equal or exceed the costs of the proposed action. However, it is the NRC's proposed determination that the values (including the safety benefit, averted cost savings, and other non-quantified benefits), considered together, outweigh the identified impacts.

One reason that the quantitative analysis shows that the alternative is not cost beneficial is the one-time NRC costs associated with developing and publishing the final rule, final regulatory guidance, and the rulemaking activities required to address internal and public comments regarding IEEE Std 603-2009. However, the regulatory analysis discusses several compelling reasons to move forward with the publishing of the proposed rule for public comment and completing the final rule.

The proposed rule creates a regulatory framework that could accelerate the pace at which licensees upgrade nuclear plant instrumentation and control systems. The rule would provide regulatory certainty for upgrading systems from analog instrumentation to digital instrumentation allowing licensees to take advantage of the benefits of these digital system upgrades. These benefits include operation and maintenance cost reduction through decreased obsolescence, fewer licensee event reports, additional performance benefits, and increased safety. The staff believes the use of qualitative factors is appropriate in this case because IEEE Std 603-2009 is a voluntary consensus standard developed by participants with broad and varied interests, which has already undergone extensive external review before being endorsed by the NRC. As such, the cost-benefit analysis for the proposed adoption of consensus standards may rely on legislative direction and these qualitative considerations generally, as a special case in the NRC's regulatory analysis guidance. The staff believes that this approach is consistent with Commission direction in the staff requirements memorandum (SRM) on SECY-14-0087, "Qualitative Consideration of Factors in the Development of Regulatory Analyses and Backfit Analyses," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15063A568).

Non-Concurrences

NRC staff individuals expressed concerns that resulted in four non-concurrences on the proposed rulemaking package (Enclosures 5, 6, 7, and 8). The staff's detailed evaluation of the concerns and the final position and outcome is included in Section C of each of the

non-concurrence packages. The staff acknowledges the number and variety of concerns expressed in the non-concurrences, especially for the potential impact of the proposed rule on the ability of operating plants to upgrade and modernize safety systems. If the Commission approves publication of the proposed rule, the staff will carefully consider all stakeholder feedback in the public comment process and make appropriate adjustments to minimize negative impacts on the ability of plants to modernize these important systems before finalizing the rule.

The first non-concurrence, NCP 2014-001, expressed concerns about the impacts of NRC-proposed restrictions on data communications for new reactors, and the effects of having different requirements for new reactors than those for operating reactors. The staff believes, based upon experience gained from staff review of the data communications aspects of new reactors, that there will be added regulatory certainty if the proposed restrictions are expressly stated in the regulation. For these reasons, the staff disagrees with the non-concurrence, and believes that the NRC should issue the proposed rulemaking for public comment.

The second non-concurrence, NCP 2014-003, also focused on the restrictions on data communications in the proposed rule. It asserted that the restrictions will not have the intended effect of increasing regulatory certainty, but will have the opposite effect because of the potential need for significant changes to platforms or systems to meet the conditions in the proposed regulatory language. This will likely result in many applicant and licensee requests for NRC approval, under 10 CFR 50.55a(z), of alternatives to the proposed regulatory restrictions on data communications. To mitigate this concern, the staff is considering enhancing the guidance of Chapter 7, "Instrumentation and Controls," of NUREG-0800, "Standard Review Plan." However, the staff believes that the benefits of added regulatory predictability and increased licensing certainty outweigh the potential negative consequences described in the non-concurrence. For these reasons, the staff disagrees with the non-concurrence, and believes that the NRC should issue the proposed rulemaking for public comment.

The third non-concurrence, NCP 2014-004, advocated re-examination of the fundamental approach in the proposed rule. The non-concurrence proposed a two-tiered approach to address generic safety system requirements and technology-specific requirements instead of the approach in the proposed rule. The non-concurrence argued that new technology and the level of complexity of current and future instrumentation and control systems may contribute to common cause failures that are not addressed in the proposed rule and could defeat system diversity. The NRC is currently addressing some of the concerns raised by the non-concurrence in other NRC activities. For example, the NRC is developing a regulatory information summary on embedded digital devices. Also, NRC research activities are examining hazards analysis methods, and this effort is informing the development of the Design Specific Review Standard and possibly future Standard Review Plan revisions. Moreover, as a result of this non-concurrence, the staff removed a draft requirement from the proposed rule related to diversity, and is taking steps to pursue a separate rulemaking effort that will address the diversity and defense-in-depth concerns described in the non-concurrence. For these reasons, the staff disagrees with the apparent position of the non-concurrence that a re-examination and change in the fundamental approach in the proposed rule is appropriate, and believes that the NRC should issue the proposed rulemaking for public comment.

The fourth non-concurrence, NCP 2015-001, disagreed with the decision to not include a requirement related to diversity for digital systems in the proposed rule (originally considered by

the staff working group during the drafting of the proposed regulation). The non-concurrence asserted that the non-inclusion of the diversity requirement will leave a regulatory gap and create ambiguity regarding the requirements for this technical area. The staff agrees that the diversity and defense-in-depth criteria to address potential common cause failures which are derived from the SRM on SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs" (ADAMS Accession No. ML003708056) should be the subject of rulemaking. However, after internal discussion and in response to NCP 2014-004, the staff decided to remove the requirements related to diversity and defense-in-depth from this proposed rule and instead address diversity and defense-in-depth considerations in a separate rulemaking (to be provided to the Commission for approval). The staff believes the current regulatory infrastructure (including the criteria in SRM-SECY-93-087) provides an adequate regulatory basis in the interim (before the rulemaking addressing diversity and defense-in-depth is completed) for the NRC to require applicants and licensees in both operating and new reactor reviews to address diversity and defense-in-depth. For these reasons, the staff disagrees with the non-concurrence, and believes that the NRC should issue the proposed rulemaking for public comment.

Compliance with New Requirements Governing Incorporation by Reference

On November 7, 2014, the Office of the Federal Register (OFR) published a final rule with new requirements governing incorporation by reference (79 FR 66267). In proposed and final rules, an agency must include a discussion of the ways that the materials the agency proposes to incorporate by reference are reasonably available to interested parties or how it worked to make those materials reasonably available to interested parties. The proposed and final rule must also summarize the material the agency proposes to incorporate by reference. The IEEE Std 603-2009 is available online in a read-only format free of charge at the American National Standards Institute portal (<http://ibr.ansi.org/Standards/ieee.aspx>), so the staff believes that it will be reasonably available to all interested parties for the duration of the rulemaking process. Section X in the *Federal Register* notice addresses the OFR requirements and sets forth the NRC's determination on reasonable availability to interested parties.

Cumulative Effects of Regulation

Consistent with the discussion in SECY-11-0032, "Consideration of the Cumulative Effects of Regulation in the Rulemaking Process" (ADAMS Accession No. ML110190027), and the Commission's approval in Staff Requirements Memorandum (SRM) dated October 11, 2011, and consistent with the NRC staff's March 7, 2012, note to the Commissioners' assistants, the NRC staff is not applying the cumulative effects of regulation process enhancements to this rulemaking. However, the staff has engaged with the public during the development of this rulemaking, most recently at a public meeting on August 4, 2015. A summary of the meeting is available under ADAMS Accession No. ML15216A636. This rulemaking would not impose new requirements on existing licensees, permit, or certificate holders. Instead, this would adopt, within 10 CFR 50.55a, a more recent version of the IEEE consensus standard. This proposed rulemaking provides regulatory relief in that current licensees who choose to upgrade their systems using the current industry standard will not need to obtain NRC approval, under 10 CFR 50.55a(z), of an alternative to using the 1991 IEEE standard.

RECOMMENDATIONS:

The staff recommends that the Commission take the following actions:

1. Approve the enclosed proposed rule (Enclosure 1) for publication in the *Federal Register* (FR).
2. Certify that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities in order to satisfy requirements of the Regulatory Flexibility Act of 1980, as amended (5 U.S.C. 605(b)).
3. Take note of the following:
 - a. The proposed rule will be published in the FR for a 120-day comment period.
 - b. The staff has prepared a draft regulatory analysis (Enclosure 3) and a daily note (Enclosure 4).
 - c. Office of Management and Budget (OMB) Paperwork Reduction Act review is required and a clearance package will be forwarded to OMB no later than the date the proposed rule is submitted to the Office of the Federal Register for publication.
 - d. The staff will inform the appropriate Congressional committees.

RESOURCES:

There are resources currently budgeted in the Fiscal Year (FY) 2015 President's Budget for rulemaking activities to amend 10 CFR 50.55a and update RG 1.153, "Criteria for Safety Systems." Resources beyond FY 2016 will be addressed in accordance with the planning, budgeting, and performance management process. A breakdown of estimated resources for current and future years is provided in Enclosure 9.

COORDINATION:

The Office of the General Counsel has reviewed this proposed rule and has no legal objection. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The Advisory Committee on Reactor Safeguards has reviewed this proposed rule and issued a letter including several recommendations (ADAMS Accession No. ML14196A137). The staff considered the Committee's recommendations and responded with a letter (ADAMS Accession No. ML14260A342). The Committee sent a second letter providing additional clarification and requested that the staff reconsider its recommendations (ADAMS Accession No. ML15039A003). The staff considered the clarifications and responded with another letter (ADAMS Accession No. ML15083A088).

/RA/

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Enclosures:

1. *Federal Register* notice
2. DG-1251
3. Regulatory Analysis
4. Daily Note
5. NCP-2014-001
6. NCP-2014-003
7. NCP-2014-004
8. NCP-2015-001
9. Resource Estimate

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Accession Nos.: ML113190983 (Package), ML113191143 (Commission Paper), ML113191306 (FRN), ML112160394 (DG-1251), ML120310194 (Regulatory Analysis), ML113191335 (Daily Note), ML14280A340 (Non-Concurrence 2014-001), ML14280A367 (Non-Concurrence 2014-003), ML14281A145 (Non-Concurrence 2014-004), ML15036A467 (Non-Concurrence 2015-001), ML14344A132 (Resources) * via email

OFFICE	NRR/DPR/PRMB/PM	NRR/DPR/PRMB/RS	NRR/DPR/PRMB/BC	NRR/DPR/DD	NRR/DE/D
NAME	AMarkley	GLappert	SHelton	LKokajko (SHelton for)	PHiland
DATE	2/24/2014	2/27/2014	3/6/2014	3/18/2014	10/27/2014
OFFICE	NRR/DE/D*	NRR/DE*	NRR/DE*	NRR/DE*	NRR/DE*
NAME	JLubinski	RStattel <i>Non-Concur</i>	DRahn <i>Non-Concur</i>	RAivarado <i>Non-Concur</i>	SWyman <i>Non-Concur</i>
DATE	12/31/2014	11/5/2014	10/27/2014	10/27/2014	10/28/2014
OFFICE	NRR/DE*	NRR/DE*	NRR/DE*	NRR/DE*	NRR/DE*
NAME	KSturzebecher <i>Non-Concur</i>	RBeacom <i>Non-Concur</i>	PChung <i>Non-Concur</i>	GSingh <i>Non-Concur</i>	SDarbali <i>Non-Concur</i>
DATE	11/6/2014	11/10/2014	10/27/2014	11/14/2014	10/23/2014
OFFICE	NRR/DLR*	NRO/DE*	NRR/DE*	NRO/DE*	NRO/DE*
NAME	CDoutt <i>Non-Concur</i>	WRoggenbrodt <i>Non-Concur</i>	JThorp	DZhang <i>Non-Concur</i>	TJackson <i>Non-Concur</i>
DATE	10/27/2014	11/4/2014	10/29/2014	6/22/2015	6/22/2015
OFFICE	ADM*	NRO*	RES*	OIS*	OE*
NAME	CBladey (JBorges for)	JTappert	BThomas	TDonnell	SGhasemian (KHanley for)
DATE	11/12/2014	1/28/2015	11/24/2014	11/6/2014	10/21/2014
OFFICE	QTE*	OGC*	NRR	EDO	
NAME	CHsu	JBiggins (NLO)	WDean	MSatorius	
DATE	4/7/2015	5/22/2015	6/23/2015	8/21/15	

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