

February 10, 2014

Mr. John W. Stetkar, Chairman  
Advisory Committee on Reactor Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

SUBJECT: DRAFT FINAL REVISIONS OF REGULATORY GUIDES 1.168  
THROUGH 1.173, SOFTWARE PROCESSES FOR DIGITAL  
COMPUTERS IN SAFETY SYSTEMS OF NUCLEAR POWER PLANTS

Dear Mr. Stetkar:

I am responding to the Advisory Committee on Reactor Safeguards (ACRS) letter dated November 20, 2013, regarding the ACRS review of the U.S. Nuclear Regulatory Commission (NRC) Staff's August 29, 2013, response to the recommendations in the June 18, 2013, ACRS letter report on Draft Regulatory Guides (RGs) 1.168 through 1.173, Software Processes for Digital Computers in Safety Systems of Nuclear Power Plants.

#### ACRS Recommendation

ACRS noted that the Institute of Electrical and Electronics Engineers (IEEE) standards referenced in the subject RGs define four levels of integrity for software. Software Integrity Level (SIL) 4 is the most stringent, and the subject RGs recommend its use for safety-related systems. ACRS agreed with the Staff's changes to the footnote in the subject RGs regarding their scope which was broadened from just safety-related systems to include use of the RGs for non-safety-related but important to safety systems. However, ACRS stated that complementary regulatory guidance is needed to clarify the intent and the degree to which the most appropriate SILs should be applied for reviews of non-safety-related systems that are "important to safety." ACRS encouraged the staff to begin the development of formal regulatory guidance to support those reviews.

#### NRC Response

The staff agrees with ACRS's recommendation for providing guidance to evaluate digital hardware and software that controls non-safety-related equipment that is important to safety. In the August 29, 2013 response to ACRS, the staff noted that current guidance documents include provisions for the review of non-safety-related but important to safety digital systems. Specifically, several sections of Chapter 7, "Instrumentation and Controls [I&C] of NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants" contain such guidance. ACRS, however, is recommending additional guidance for digital systems that would more specifically address the use of SILs.

The staff's review of an applicant's proposed software development processes for non-safety-related but important to safety digital systems has been manageable using the existing regulatory guidance and the staff's knowledge of SILs as described in standards endorsed by

the subject RGs. IEEE Standard 1012-2004 has criteria for selecting the appropriate SIL based on the criticality of the software application.

While additional guidance that would more specifically address the use of SILs may be useful, staff assessments have not identified this as a priority need for digital system regulatory guidance improvement initiatives. Adopting this recommendation will require further study of the full context of the application of important to safety designation and criteria. The important to safety designation is broadly applied across nuclear power plant systems using varying regulatory criteria. The recommended changes in digital I&C guidance would need to be consistent with other important to safety regulatory applications. The staff also believes it would be useful to obtain industry input on the regulatory application of SILs. The staff will communicate with industry and other stakeholders to obtain input on the extent of specific application of less than SIL 4 criteria for the subject equipment.

It should be noted that for Small Modular Reactor licensing, the Office of New Reactors (NRO) is proposing the use of a Hazard Analysis (HA) approach in the new mPower Design Specific Review Standard (DSRS) Chapter 7. NRO has discussed the HA approach with ACRS and more recently the staff from the Office of Nuclear Regulatory Research (RES) presented a draft "Technical Basis to Review Hazard Analysis of Digital Safety Systems," Research Information Letter, RIL-1101 (September 19, 2013 ACRS DI&C Subcommittee meeting). The latest 2012 version of IEEE Standard 1012 incorporates the use of HA in the software Verification & Validation and SIL processes. The staff believes that any further specific guidance for SILs for non-safety-related but important to safety digital systems will need to be coordinated with the staff's further development of the HA use in digital I&C regulatory guidance. Therefore, the staff will consider the need for additional regulatory guidance regarding the use of SILs for non-safety-related but important to safety digital systems during the development of future updates to RG 1.168, Chapter 7 of the SRP and HA-related guidance development.

The NRC staff appreciates the comments and recommendations provided by ACRS. We look forward to continuing discussions with the committee as the staff evaluates future updates to RGs.

Sincerely,

*/RA/*

Mark A. Satorius  
Executive Director  
for Operations

cc: Chairman Macfarlane  
Commissioner Svinicki  
Commissioner Apostolakis  
Commissioner Magwood  
Commissioner Ostendorff  
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