CHAIR
John White
GSE True North Consulting, LLC
1030 E. Hwy 377
Ste. 110-266
Granbury, TX 76048
j.l.white@ieee.org

VICE CHAIR
Mark Bowman
Tennessee Valley Authority
1101 Market Street LP4G-C
Chattanooga, TN 37402
mdbowman@tva.gov

SECRETARY
Robert Konnik
Champlain Cable Corp.
175 Hercules Dr.
Colchester, VT. 05446
rkonnik@ieee.org

PAST CHAIR
Daryl Harmon
Westinghouse Electric Co. LLC
20 International Dr.
Windsor, CT 06095
harmondl@westinghouse.com

STANDARDS COORDINATOR
Suresh Channarasappa
Westinghouse Electric Co.
channas@westinghouse.com

SUB-COMMITTEE CHAIRS

SC-2 Qualification
Eric Rasmussen
RSCC Wire and Cable LLC
eric.rasmussen@r-scc.com

SC-3 Operations, Maintenance, Aging, Testing, and Reliability
Rebecca Steinman
Constellation
Rebecca.Steinman@constellation.com

SC-4 Auxiliary Power
Mitch Staskiewicz
Mirion Technologies Inc.
mstaskiewicz@mirion.com

SC-5 Human Factors, Control Facilities, and Human Reliability
David Desaulniers
U.S. NRC
David.Desaulniers@nrc.gov

SC-6 Safety Related Systems
Christopher Lamb
Sandia National Laboratories
cclamb@sandia.gov

March 4, 2022

Ms. Louise Lund
Director, Division of Engineering, Office of Nuclear Regulatory Research
NRC Standards Executive
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Potential NRC Endorsement of IEEE Std 1819-2016, "IEEE Standard for Risk-Informed Categorization and Treatment of Electrical and Electronic Equipment at Nuclear Power Generating Stations and Other Nuclear Facilities"

Dear Ms. Lund,

In October 2019 the Institute of Electrical and Electronics Engineers (IEEE) Nuclear Power Engineering Committee (NPEC) requested the U.S. Nuclear Regulatory Commission (NRC) consider a number of standards for official endorsement. IEEE 1819-2016 was one of the standards included in the list of desired endorsements. Regulatory Guide (RG) 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance," currently endorses NEI 00-04, "10 CFR 50.69 SSC Categorization Guideline," as an acceptable method for complying with 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." IEEE 1819-2016 provides supplemental guidance to ensure that electrical and electronic equipment is not mis-categorized or mis-treated due to a lack of details regarding the unique characteristics of those electrical and electronic components in other industry documents.

In a presentation to the Risk Management Committee of the Pressurized Water Reactor Owners Group (PWROG) on August 18, 2021 (ADAMS Accession No. ML21231A167), the NRC shared two potential endorsement paths under consideration including revision of RG 1.201 or development of a new RG. In October 2021, the Nuclear Energy Institute (NEI) and the PWROG / Boiling Water Reactors Owners Group (BWROG) separately wrote to the NRC urging the staff to not pursue endorsement of IEEE 1819-2016 (ADAMS Accession Nos. ML21292A307 and ML21300A176, respectively). The primary bases for their position were (1) that industry implementations of 10 CFR 50.69 to date have used NEI 00-04 without needing to reference IEEE 1819-2016 and (2) that endorsement of the IEEE standard has the potential to lead licensees to think mechanical and electrical equipment should be treated differently under 10 CFR 50.69.

Electrical and electronic equipment utilized in Class 1E functions are in general different than mechanical equipment, in that electrical equipment provides electric power to many different mechanical and instrumentation components, while electronic equipment provides status information to the operators, as well as control and protection signals to various mechanical and electrical components. Thus, it is appropriate for them to be addressed separately, particularly when their risk category cannot be singularly determined by existing guidance. IEEE 1819-2016 Clause 5.1 explicitly states: "This clause is intended to provide clarification for categorizing components in electrical or electronic systems that are not easily categorized using existing industry guidance." Clause 5 provides methods to correctly categorize components of electrical systems with two or more categorization classes (RISC-1, 2, 3, or 4). Specific methodology is provided for assigning risk-informed safety

classifications (RISC) based on the load's active function and the aggregate RISC appropriate for the electrical components. Methodology is also provided for assigning RISC for (a) components not associated with supplying power, such as functions providing overcurrent or fault protection, and (b) systems that do not supply power, such as a lighting system or instrument monitoring and protection systems. And considerations are provided in Subclause 5.3.4.5 for specific component types, including circuit breakers; busbars, cables and transformers; and distribution panels and relay panels. The working group that developed IEEE 1819-2016 included utility and consultant personnel, relying on them to identify gaps that needed to be filled to effectively categorize these electrical components. Other guidance documents do not address electrical component classification in sufficient detail and IEEE 1819-2016 was specifically developed to fill these gaps and not to provide detailed methods for performing the probabilistic risk assessment (PRA) activities needed to support the characterization scheme, for which IEEE 1819-2016 simply refers to other relevant guidance such as ASME/ANS RA-Sa-2009 or NEI 00-04.

Clause 6 addresses treatment requirements for the four RISC classifications, with treatment based on the safety significance of the components. Alternate treatment requirements are differentiated from special treatment requirements in the use of "reasonable confidence" versus "reasonable assurance." RISC-1 equipment shall continue to meet the existing special treatment requirements identified in applicable regulatory requirements, which corresponds to the scope of the deterministic IEEE standards. The treatments for RISC-2 components (Subclause 6.3) are reconsidered based on their safety significant characterizations. For RISC-3 components (Subclause 6.4), the existing program requirements are examined to identify ones that no longer apply per 10 CFR 50.69; examples include equipment qualification and maintenance rules; and alternate treatment requirements are developed for each program such that there is reasonable confidence that the RISC-3 equipment can continue to perform its design basis functions. RISC-4 equipment is unchanged in that special treatment requirements never applied.

This standard is recommended for NRC endorsement specifically because it addresses categorization of electrical and electronic components / systems (in similar fashion to NEI 00-04 but with the complementary detail needed for those components) and fills in missing details with respect to special treatment (quality assurance, EQ, and seismic qualification as examples) of electrical and electronic equipment that are not fully covered by the current guidance. Thus, the standard endorsement enhances safety and fills an existing gap without negatively impacting licensees whose 50.69 programs have already been approved.

While it is true that licensee amendments approved to date have not referenced IEEE 1819-2016, NPEC has not identified a negative impact associated with NRC endorsement of the standard; on the contrary, this standard provides an appropriate methodology to properly categorize and treat electrical system components in a manner consistent with 10 CFR 50.69. IEEE 1819-2016 also provides a critical link for advanced reactors or small modular reactor developers between modern risk-informed methodologies and traditional special treatment requirements covered by other IEEE standards. Additionally, it is worthwhile to note that consensus standards fill a unique role in our industry. Since any member of the public can be involved in the development, review, or approval process, a consensus standard fills a different role and can be seen as independent confirmation of government or industry developed guidance. Thus, endorsement of IEEE 1819-2016 could also be viewed as an independent confirmation of the high level concepts in the current guidance.

In conclusion, consistent with the NRC modern risk-informed approach, NPEC recommends and supports the NRC endorsement of IEEE 1819-2016 as a standard that is used in conjunction with other industry guidance to provide a comprehensive risk-informed categorization of electrical and electronic equipment and to ensure that special and alternate treatment requirements are appropriately applied.

Sincerely,

John White
IEEE Nuclear Power Engineering Committee - Chair