



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

August 17, 2021

The Honorable Christopher T. Hanson,
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

**SUBJECT: SUMMARY REPORT – 687th MEETING OF THE ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS, JULY 7-9, 2021**

Dear Chairman Hanson:

During its 687th meeting, July 7-9, 2021, which was conducted virtually due to the COVID-19 pandemic, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters. The ACRS completed the following correspondence:

LETTER REPORT

Letter Report to Christopher T. Hanson, Chairman, U.S. Nuclear Regulatory Commission (NRC), from Matthew W. Sunseri, Chairman, ACRS

- Rulemaking Plan on Revision of Inservice Testing [IST] and Inservice Inspection [ISI] Program Update Frequencies Required in [Title 10 to the *Code of Federal Regulations*] 10 CFR 50.55A, dated July 26, 2021, Agency-wide Documents Access and Management System (ADAMS) Accession No. ML21203A205

LETTERS

Letters to Margaret M. Doane, Executive Director for Operations (EDO), NRC, from Matthew W. Sunseri, Chairman, ACRS

- Proposed Draft Regulatory Guide 1.9, Revision 5, Application and Testing of Onsite Emergency Alternating Current Power Sources in Nuclear Power Plants, dated July 26, 2021, ADAMS Accession No. ML21202A149
- Safety Evaluation of Vogtle Electric Generating Plant Units 1 and 2 License Amendment Requests for Risk-informed Resolution to GSI-191, dated July 26, 2021, ADAMS Accession No. ML21203A297

MEMORANDA

Memoranda to Margaret M. Doane, EDO, NRC, from Scott W. Moore, Executive Director, ACRS:

- Documentation of Receipt of Applicable Official NRC Notices to the Advisory Committee on Reactor Safeguards for July 2021, dated July 13, 2021, ADAMS Accession No. ML21189A306
- Regulatory Guides, dated July 13, 2021, ADAMS Accession No. ML21189A330

HIGHLIGHTS OF KEY ISSUES

1. Rulemaking Plan on Revision of Inservice Testing and Inservice Inspection Program Update Frequencies Required in 10 CFR 50.55A

Licensees are required to update their ISI and IST plans every 120 months in accordance with the latest operation and maintenance (OM) and Section XI editions incorporated in 10 CFR 50.55a. The 120-month update requirement corresponds to the ten-year inspection intervals in these plans.

EMBARC Venture Studio (EMBARC), an organization within the U.S. NRC, Office of Nuclear Reactor Regulation, was created to identify barriers to innovation and launch initiatives that improve the way the NRC works to make safe use of nuclear technology possible and to help transform the agency into a modern, risk-informed regulator. EMBARK initiated a project to evaluate how the NRC might streamline the way it regulates consensus Codes and Standards under 10 CFR 50.55a. The EMBARK team developed a list of initial ideas, along with associated technical bases and cost estimates. Based on criteria that included legal feasibility, industry needs, greatest cost benefit, and no negative impact on safety, the team agreed to three recommendations for management consideration:

1. Relax the requirement to update ISI and IST programs every 10 years following the next update to 2019/2020 ASME Codes.
2. Institute streamlined rules for unconditional approval of Code Cases.
3. Decrease the frequency of Code Edition rulemakings.

The EMBARK team concluded that these recommendations would contribute to the efficiency and effectiveness of the NRC's 10 CFR 50.55a regulatory activities.

SECY-21-0029 was issued in March 2021, requesting Commission approval to pursue recommendation (1) above with a revised update interval of 240 months, as well as approval and delegation to the Executive Director for Operations (EDO), and a potential subsequent rulemaking to extend the update interval from 240 months to 288 months.

The ACRS is on record, via previous letters issued in 1999 and 2000, of opposing a related staff recommendation (SECY-99-017) to totally eliminate the 120-month update requirement for ISI and IST programs.

The requirement for 120-month updates to ISI/IST programs dates back to the early days of nuclear power plant development, when ASME Section XI was first issued (early 1970s). During this time, and in subsequent decades, the Section XI Code was in a state of continual expansion and development. Many of the changes reflected operating experience with new and varied degradation mechanisms. Discovery of new degradation mechanisms has slowed greatly in recent years, and the ASME Codes have matured to the point that major changes are no longer being published. As a result, relaxing the requirement to update ISI and IST programs from every 120 months to 240 months would have minimal impact on safety and provide flexibility to the industry, once licensees have implemented recent ASME Section XI and OM Code editions (2019/2020 or later).

Regarding the earlier ACRS letters on this topic, new information, data, and models were evolving quite rapidly at that time (1999-2000). That is no longer the case. Also, the earlier proposal to which ACRS objected (SECY-99-017), was to totally eliminate the regulatory requirement to periodically update ISI/IST programs. The current proposal is just to extend the time period between required periodic updates, not eliminate them.

Other major developments since our 1999 and 2000 letters on this topic are the Generic Aging Lessons Learned reports, licensee implementation of Aging Management Programs as part of License Renewal programs, and issuance of License Renewals (LRs) and Subsequent License Renewals (SLRs). Many of the safety-related structures, systems and components (SSCs) included in these activities rely on the ASME Boiler and Pressure Vessel (BPV) Code as the reference standard. The interval length for LR and SLR (20 years) is compatible with the proposed change to 240 months. If new degradation mechanisms or acceleration of known mechanisms occur, new Code Cases could be developed quickly when needed as a short-term response. The NRC will continue to review new or revised Code Cases for incorporation into the regulations on a biannual basis. The NRC can mandate the use of certain Code Cases to supplement the current Code of record if new safety concerns are identified.

Lastly, ASME is currently evaluating a change to the ten-year inspection interval imposed by the current Code. SECY-21-0029 also requests approval and delegation to the EDO, potential subsequent rulemaking to extend the update interval from 240 months to 288 months for consistency with this change. The Committee has no objection to this potential change, should it occur.

Committee Action

The Committee issued a letter on July 26, 2021, with the following conclusion and recommendation:

- The Committee concurs with the proposed recommendations in SECY-21-0029 to extend the required ISI/IST plan update interval from 120 months to 240 months, with a potential future extension to 288 months.
- Staff should also move expeditiously to implement the two additional recommendations in the EMBARK Venture Studio's report regarding streamlining rules for Code Case approval and decreasing the frequency of Code Edition rulemakings.

2. Proposed Draft Regulatory Guide 1.9, Revision 5, Application and Testing of Onsite Emergency Alternating Current Power Sources in Nuclear Power Plants

The purpose of RG 1.9 is to provide guidance that the staff of the NRC considers acceptable to comply with the NRC regulations for onsite emergency alternating current (AC) power sources in nuclear power plants. These power sources include the currently used sources, emergency diesel generators (EDGs) and combustion turbine generators (CTGs). It also incorporates guidance for other alternative sources of AC for onsite emergency power systems that may be proposed for future large light water reactors, small modular reactors, advanced reactors, and other nuclear facilities.

Proposed Revision 5 to RG 1.9 endorses updated Institute of Electrical and Electronics Engineers standard (IEEE) Std 387-2017, "IEEE Standard for Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," and IEEE Std. 2420-2019, "IEEE Standard Criteria for Combustion Turbine-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," with positions/clarifications as acceptable for the design of onsite emergency AC power systems. With the exception of the issues of continuous rating and "mission time," which will be addressed later in this report, these two IEEE Stds. with clarifications are consistent and suitable for endorsement.

Issue 1 – Inconsistent definition of functional criteria in regulatory guidance

In the absence of an industry standard, the regulatory guidance for AC sources other than EDGs and CTGs is not consistent in defining functional criteria with that provided by the industry standards and regulatory guidance for EDGs and CTGs.

As currently written, there is a major inconsistency between the industry standards and RG guidance being applied for EDGs and CTGs and those being applied to AC Sources Other than EDGs and CTGs (Other AC Sources) that could result in the lack of performance attributes that provide safe and long-term plant operation when off-site power is lost. For "Other AC Sources," standards do not exist similar to IEEE Stds. 387-2017 (EDGs) and 2420-2019 (CTGs) that can be endorsed for this category of potential emergency power sources. The only guidance is the lead-in sentence for C.1 which states that "...the following considerations should be addressed to meet the regulations cited in Part A of this RG..." What follows are 13 performance attributes with sub-paragraphs stating that various items should be assessed and discussed. There are not any specific expectations or guidance which identify criteria to be evaluated.

The Committee's letter identified several examples of functional, performance-based criteria that the Committee said should also apply to "Other AC Sources" and be incorporated into Section C.1. The Committee also indicated that the same thought process applies to Sections 1, 2, 5, 6, and 7 including the Annexes in each of the IEEE Stds. for the EDGs and CTGs, respectively. Many of the criteria would apply to "Other AC Sources" and are performance based. They should be evaluated and incorporated.

Issue 2 – Definition of CTG Rating

IEEE Stds. 387-1995 and 2017 define the continuous rating of diesel-generator unit as "The electric power output capability that the diesel generator unit can maintain in the service environment for 8760 hours of operation per year with only scheduled outages for Maintenance."

IEEE Std. 2420-2019 defines the rating of combustion turbine-generator unit as “The electric power output capability that the combustion turbine-generator unit can maintain in a specified environment and is stamped on its name plate and/or described in its specification.” The IEEE EDG Std. provides a more complete definition by specifying an operating time frame for the term continuous rating. The Committee recommends that this more complete definition be included in RG 1.9, Revision 5. This would provide consistent guidance for the meaning of continuous rating for both the EDGs and CTGs.

“Other AC Sources” involve technologies much different from conventional sources including possible energy storage systems. Many new but related issues may apply to these sources, for example power quality (harmonics generated by DC to AC conversion), generation and storage compatibility with demand requirements, and short and long-term power delivery capability.

Therefore, consistency of rating definitions is even more important when applied to “Other AC Sources.”

Finally, the NRC staff introduced the term “mission time” in this revision of the RG. Although the Committee agrees with the intended use of the term in this RG, there are varied regulatory references that use this term in facility inspections. There is also a succinct and different definition in the NRC endorsed Nuclear Energy Institute (NEI)- 99-02, “Regulatory Assessment Performance Indicator Guideline.” As a result, the introduction of this term in this RG may be problematic during performance of the Reactor Oversight Program (ROP). Alternative language could be considered.

Committee Action

The Committee issued a letter on July 26, 2021, with the following conclusions and recommendations:

- For AC sources other than EDGs and CTGs, RG 1.9, Revision 5, Section C.1 becomes the default standard. In the absence of an industry standard, the regulatory guidance for AC Sources Other than EDGs and CTGs is not consistent in defining functional criteria with that provided by the industry standards and regulatory guidance for EDGs and CTGs. RG 1.9, Section C.1 should be structured and expanded to be consistent with applicable guidance in the IEEE Stds. for EDGs and CTGs.
- For consistency, the definitions for ratings in Sections C.1 and C.3 should use the definition derived in IEEE Std. 387-2017. Consistency of rating definitions is even more important when applied to AC Sources Other than EDGs and CTGs since they will involve technologies much different from conventional sources, including possible energy storage systems which must also provide power capability and duration consistent with EDGs and CTGs.

3. Safety Evaluation of Vogtle Electric Generating Plant Units 1 and 2 License Amendment Requests for Risk-informed Resolution to GSI-191

Vogtle Units 1 and 2 contain Westinghouse four-loop pressurized water reactors (PWRs) rated at 3626 MWt. To address safety issues discussed in Generic Safety Issue (GSI)-191 and Generic Letter (GL) 2004-02, SNC proposed a risk-informed approach using the five key

principles in RG 1.174. SNC subsequently submitted two license amendment requests (LARs) to implement their proposed risk-informed approach at these two Vogtle units. In addition to amending several technical specifications, the licensee requested an exemption to allow the use of risk-informed information as an alternative to certain requirements associated with the deterministic evaluation required by 10 CFR 50.46(a)(1).

The Committee's review focused on several topics: modifications and testing, engineering evaluations, and monitoring.

Regarding modifications and testing, over the period since issuance of GSI-191, the licensee has already implemented various physical and procedural changes. These modifications included installing new strainers with increased surface areas and reduced opening sizes, increasing Refueling Water Storage Tank (RWST) inventory, removing problematic insulation materials, changing procedures to delay isolation of Residual Heat Removal (RHR) pumps from the RWST, and modifying program controls to ensure debris load limits are not exceeded. SNC has proposed reducing the RHR strainer screen height, allowing these strainers to become fully submerged for an increased number of postulated scenarios.

The licensee will also add a new technical specification to enhance containment sump reliability. Regarding engineering evaluations, in its approach, the licensee combined its probabilistic risk assessment (PRA) with traditional engineering analysis to evaluate change in core damage frequency and change in large early release frequency. This approach used Vogtle Units 1 and 2 PRA models for internal and seismic events.

In evaluating long-term core cooling (LTCC), the licensee compared parameters, including fuel types, fiber limits, sump switchover time, rated thermal power, and minimum time for chemical effects to result in precipitation, with industry findings (WCAP-17788) and staff guidance. The amount of fiber that may reach the core inlet exceeded the WCAP limit in some cases. By crediting the reduced head loss due to non-uniform material buildup associated with coolant flow, the licensee showed that additional fiber could accumulate before core inlet channels become blocked. The staff concurred that in-vessel debris will not block the core inlet prior to the availability of cooling through alternate flowpaths and found there is reasonable assurance that in-vessel debris will not limit LTCC.

For these assessments, the licensee modified the PRA model to consider additional structures, systems, and components (e.g., sump strainers) and events (e.g., core blockage scenarios). A screening approach was used to focus analysis on a discreet set of breaks that were significant risk contributors.

In accordance with RG 1.174 and NUREG-1855, the applicant performed an uncertainty evaluation, which focused on Δ CDF and included parametric, model, and completeness considerations. Parametric and model uncertainties were evaluated through sensitivity runs. Completeness uncertainty was qualitatively evaluated. All parametric and model uncertainty/sensitivity results were acceptable based on RG 1.174 guidance.

Independent staff calculations, using conservative inputs, confirmed that there were adequate margins in the licensee's results. The staff concluded that the analysis scope and level of detail were sufficient and that the PRA model used for the evaluation complies with RG 1.200, Revision 2, and can be applied in regulatory decision-making.

Regarding monitoring, the licensee implemented procedures and programs for monitoring, controlling, and assessing changes having the potential to impact inputs and assumptions used in the PRA and associated engineering analysis supporting these LARs. These procedures and programs ensure that potential debris accumulation in containment is limited, the impact of observed changes is assessed, and the capability of the sump strainers is maintained. SNC provided a list of relevant programmatic requirements including its Maintenance Rule program, its online configuration risk management procedure, and its quality assurance program. The licensee stated that no changes would be made to ASME Section XI inspection programs or mitigation strategies.

Consistent with recommendations in the staff evaluation of Technical Specification Task Force Traveler, TSTF-567, the licensee proposed a new technical specification that provides operability requirements and expands existing surveillance requirements for the containment sump. The new technical specification requires verification, by visual inspection, that the containment sump does not show structural damage, abnormal corrosion, or debris blockage. It also requires inspection of the containment drainage flow paths, the containment sump strainers (or screens), the pump suction trash racks, and the inlet to relevant piping.

The licensee committed to performing periodic updates of its risk-informed assessment every 48 months. If such updates reveal non-conforming situations with respect to GSI-191 (i.e., acceptance criteria of RG 1.174 are exceeded), the licensee will address these items in their corrective action program.

Committee Action

The Committee issued a letter on July 26, 2021, with the following conclusions and recommendations:

- The SNC proposed changes to the Vogtle Units 1 and 2 licensing bases and the related exemption request are acceptable.
- The safety evaluation report should be issued, and the related exemption should be approved.

4. Discussions at the Planning and Procedures (P&P) Session

The Committee discussed the Full Committee and Subcommittee schedules through November 2021 as well as the planned agenda items for Full Committee meetings.

The ACRS Executive Director also led a discussion of significant notices issued by the Agency since the last Full Committee meeting in June 2021 (this activity is documented in the memorandum dated July 13, 2021).

The Committee discussed recommendations on review of several draft and final regulatory guides, as documented in the memorandum mentioned above, dated July 13, 2021.

The Committee discussed the Commission-approved agenda for the meeting with the ACRS scheduled for October 8, 2021. The presenters will draft their presentation materials which will be discussed during the September Full Committee meeting.

Chairman Sunseri and ED Moore led a discussion about plans for eventual conduct of in-person and hybrid meetings with Members attending at NRC headquarters and via Microsoft Teams. The current plan is to conduct a hybrid meeting for the September Full Committee meeting and follow NRC's COVID-19 requirements.

Member Ballinger led a discussion about the joint meeting of the Subcommittee on Metallurgy & Reactor Fuels and the Subcommittee on Radiation Protection & Nuclear Materials which was held on June 23, 2021, to discuss DG-3055 which will be the new RG 3.76, "Implementation of Aging Management Requirements for Spent Fuel Storage Renewals." The Subcommittee recommended not to write a letter on this guide. It was noted that there will be further discussion of this matter at the Safety Research Program Subcommittee meeting scheduled for July 23, 2021 and it may be addressed as part of the biennial research report.

The Committee discussed staff responses to the ACRS letters on Regulatory Guide 4.26, "Volcanic Hazards Assessment for Proposed Nuclear Power Reactors Sites," and NuScale Topic Report – Control Room Staffing Plan. It was agreed that no further action was necessary for these issues.

The Committee held a closed portion of the P&P session to discuss sensitive information.

5. Scheduled Topics for the 688th ACRS Meeting

The following topics are on the agenda for the 688th ACRS meeting scheduled for September 8-10, 2021:

- Kairos Topical Report on Fuel Performance
- Commission meeting preparations

Sincerely,



Signed by Sunseri, Matthew
on 08/17/21

Matthew W. Sunseri
Chairman

August 17, 2021

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