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MEMORANDUM TO: Brian E. Thomas, Director  
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Office of Nuclear Regulatory Research

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SUBJECT: SUMMARY OF THE 2018 NRC STANDARDS FORUM

On September 11, 2018, the Regulatory Guidance and Generic Issues Branch in RES/DE held the third annual NRC Standards Forum.<sup>1</sup> The purpose of the Standards Forum is to help identify needed standards within the nuclear industry that are currently not being addressed by standards development organizations (SDOs), and to collaboratively accelerate their development. Enclosure 1 contains the Agenda for the Forum. There were over 70 meeting attendees, which included representatives from many SDOs, including ASTM, ASME, ANS, ACI, and IEEE; as well as representatives from industry, including NEI and EPRI. There were also several representatives from DOE and DOE national laboratories, and numerous staff from the NRC offices of NRO, NRR and RES (see Enclosure 2 for the full list of attendees). The presentations and handouts from the meeting can be found at <https://nrcweb.nrc.gov/about-nrc/regulatory/standards-dev/standards-forum.html>.

### Summary

This year the forum continued the theme of “Collaborate to Accelerate” by addressing topics for standards development and process improvements. The presentations provided an overview of NRC standards activities, offered updates on topics from previous Forums that have been completed, and provided the processes for identifying and prioritizing standards across stakeholder groups. The discussions were valuable to understanding how the stakeholder groups, including the NRC, can be more effective in developing standards. The action items that resulted from discussions during the Forum are in Enclosure 3. The following is a summary of the discussions and the major action items.

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<sup>1</sup> Public Meeting Notice: <https://www.nrc.gov/pmns/mtg?do=details&Code=20180897>

## Discussions

- The NRC presented the status of the previous topics of interest and requested that participants assist in dispositioning items that still need attention (ML18256A372). There are currently 64 topics being tracked from Nuclear Energy Standards Coordination Collaborative (NESCC) meetings and previous NRC Standards Forums. The NRC is assisting stakeholders on five of the topics to develop coalitions and to obtain necessary reports from the Electric Power Research Institute (EPRI). There are 25 open topics that require SDOs to provide Champions to determine if the topics are appropriate for standards development.
  - Participants were given the opportunity to indicate interest in joining coalitions for the topics.
    - Action Item: The NRC will send out the list of topics (see Enclosure 4) to the participants for further identification of coalition members. In particular, the American Society of Mechanical Engineers (ASME) agreed to share relevant open topics with their committees for interest level and possible identification of Champions for the issues.
  
- All of the 2017 action items were completed and the outcomes were reported. Three items were presented on during the Forum.
  1. The American Nuclear Society (ANS) and the NRC held a workshop in May 2018 for industry stakeholders to develop a strategic vision for advanced reactors standards, with general outcomes below (ML18256A373).
    - Although there could be significant improvements, current standards are sufficient for both licensing and design of advanced reactors.
    - An agreement that, when possible, standards for advanced reactors should be risk informed and performance based.
    - Specific standards were identified for priority development or update, and also as cross-cutting across technologies.
    - There was agreement that more effort should be taken to better coordinate, and in some cases integrate, standards developed by the various SDOs.
  
  2. The NRC provided an update on the status of endorsement of ASME Boiler and Pressure Vessel Code Section III, Division 5 (ML18256A375).
    - The code provides certainty and guidance to applicants for design, fabrication and testing of advanced reactors. However, the current code does not provide guidance on the high temperatures in advanced reactors.
    - The NRC is reviewing the code to determine if it can be endorsed by looking at previous code cases that were assessed. The anticipated result is to endorse the code through a regulatory guide, likely with conditions.
    - There are no plans to incorporate the code in 10 CFR Part 50.55a; the NRC believes the code should be regulatory guidance vice a regulatory requirement.
    - A public meeting will be held later in calendar year 2018.
    - The NRC will not be conducting a risk-informed, performance-based review. The rules for Division 5 are based upon deterministic standards. The overall risk case for a plant should be done from the NRC's standpoint, not by ASME. The NRC is looking at licensing modernization within the agency which will look at risk-informed, performance based approach.
    - Although some advanced reactors use low pressure at high temperature, Division 5 will be focusing on high temperature-related failures and creep.

- Action Item: ANS (P. Kadambi) asked to work with ASME Division 5 (J. Nestell) to consider risk-inform performance-based approaches into standards for advanced non-light water reactors.
3. The Nuclear Energy Institute (NEI) provided a draft list of topics areas (ML18256A370) for which their members are interested in pursuing standards development. The process for assessing these topics is planned to be improved for the 2019 Standards Forum (ML18256A364). The process for working on 10 CFR Part 50.69 was also discussed as an example of how NEI interfaces with NRC, its members and other stakeholders.
    - NEI will electronically survey its members, and other stakeholders such as industry suppliers and EPRI for topics for standards development. The survey will ask for responders to prioritize submissions. NEI will categorize based on code/standards and by operating fleet/advanced reactor construction or design. The topics will be prioritized based on survey results.
    - NEI interfaces with NRC to coordinate License Amendment Requests (LAR) submittals and on generic issues related to Part 50.69. NEI also sits on a Joint Owners Groups Working Group that provides oversight and infrastructure for the industry's coordinated Part 50.69 efforts. NEI has extensive interactions with ASME on standards related to 50.69, but they are low on membership in IEEE and ANS.
      - Action Item: Participants are encouraged to provide feedback on how to solicit or categorize input for the survey (please email Steve Vaughn at [svj@nei.org](mailto:svj@nei.org) by November 1).
      - Action Item: NEI to share prioritized list with the NRC well ahead of the 2019 Standards Forum.
      - Action Item: NRC will help facilitate engagement between NEI, IEEE and ANS for enhanced interactions.
  - The NRC provided an overview of the NRC use of codes and standards, specifically processes for standards' endorsement and internal prioritization (ML18256A374).
    - The NRC will only endorse standards that support the activities important to the NRC's regulatory activities.
    - SDOs are encouraged to notify the NRC of new and revised standards.
    - NRC reserves the right to apply conditions, limitations, or modifications to the use of consensus standards. However, NRC will try to avoid conditions by working with stakeholders and SDOs.
    - The prioritization process is to help focus NRC resources, identify NRC interests and align with SDO activities.
      - Action Item: Based on comments from participants, NRC will discuss with ASME concerns that NRC staff on committees are voting on behalf of the agency, rather than based on their personal opinions in accordance with ASME procedures.
  - Updates were provided on two topic areas discussed during the NESCC meetings: electrical, and concrete and structures.
1. IEEE Nuclear Power Engineering Committee (NPEC) gave an overview on how they are contributing to the industry, including addressing the increased use of digital technology. (ML18256A377)
    - The NRC endorses many IEEE standards through regulatory guides and in rules.
    - IEEE extensively collaborates with EPRI.
    - NPEC is considering fault tolerance, and ideal separation for fire, electrical, and train independence for future reactors.

2. Codes and Standards for Structural and Seismic Safety: NESCC and the NRC Standards Forum (ML18256A376).
  - Follow up on report that was developed as part of the NESCC meetings, "[Concrete Codes and Standards for Nuclear Power Plants: Recommendations for Future Development](#)."
    - The report provided many useful recommendations for future updates for codes and standards for concrete design. The SDOs for concrete have been evaluating the recommendations for their codes. For example, recommendations on design approaches used for containments and other safety-related structures are being implemented by American Concrete Institute (ACI), for which the NRC representatives are leading the effort.
  - Follow up on report, "Codes and Standards for the Repair of Nuclear Power Plant Concrete Structures: Recommendations for Future Development," also developed as part of the NESCC meetings.
    - Not much repair is being conducted on concrete at nuclear power plants, but there is useful information on evaluation of concrete structures if there was some damage. The guidance that NRC develops is mostly related to monitoring and license renewal.
  - Under the auspices of the Forum, NRC has been able to develop interactions with SDOs to identify areas of interest or areas where standards updates may require updates in NRC Staff Positions.
    - For example, the Forum has facilitated engagement between NRC and the SDO for steel and steel plate composites. NRC did not have a regulatory guide for this topic, but was able to work with the SDO as they were developing a standard (AISC N960) to ensure that the NRC will be able to issue a staff position in a timely manner. Currently, NRC is drafting a regulatory guide to endorse the standard.
  - The NRC is evolving to a risk-informed, performance based design for seismic safety based on discussions at NESCC meetings but has a few more years before implementation is complete. The process to develop a performance- based approach began between 1996 and 2002, demonstrating that this type of approach is not quick. Future direction to pursue possibilities is outlined in NUREG/CR-7214.
- An SDO panel comprised of representatives from ASME, IEEE, ANS and NFPA provided an overview of how each identifies and prioritizes topics, and leverages partnerships. (ML18256A378, ML18256A379, ML18256A362)
  - All SDOs agree that collaboration and partnerships are beneficial to developing robust codes and standards.
  - SDOs recognized that partnerships are often based on intrapersonal relationships between members of SDO committees and other stakeholders. Additionally, SDOs often rely on committee members to determine the issues to be addressed in standards.
  - Formal partnerships are valuable to ensure that data and research are available for SDOs, e.g., there could be liaisons to organizations such as DOE or EPRI that inform the appropriate SDO when research has been completed and share reports directly with the SDO committee.
  - However, partnerships should not be too formalized as to delay standard development.
- EPRI presented on identifying research projects and delivering the results. (ML18256A363)
  - EPRI works closely with NRC's Office of Nuclear Regulatory Research on topics that benefit both to optimize resources. EPRI also has a strong relationship with DOE.

- EPRI considers the following when evaluating and prioritizing research: current or emerging issue, importance or severity of issue, value across stakeholders, nuclear plant designs, geographical boundaries, available resources, timing, tactical-strategic balance in R&D portfolio, and opportunities for collaborations and leveraging of resources and impact (e.g., standards).
- As a non-profit scientific research 501(c)(3) organization, EPRI has an obligation to make the results of its scientific research available to the public on a non-discriminatory basis. The pricing is intended to fairly reflect the cost to the funders and annually evaluates products older than five years for reduced or zero pricing.
- EPRI also provided new areas of research for participants to learn about in the back-up slides of the presentation.
- Department of Energy (DOE) provided information their Gateway for Accelerated Innovation in Nuclear (GAIN) program (ML18256A365) and an update on DOE consensus-based standards efforts in the Office of Nuclear Energy (ML18256A367).
  - GAIN:
    - Mission is to, “Provide the nuclear energy industry with access to the technical, regulatory and financial support necessary to move innovative nuclear energy technologies toward commercialization in an accelerated and cost-effective fashion.”
    - GAIN connects nuclear innovators to DOE laboratory capabilities and research and development programs, and collaborates with multiple stakeholders.
    - Supports the publishing of the “[Advanced Nuclear Directory](#)” which offers a sample of companies engaged in the development of advanced nuclear technologies.
    - Future activities include workshops on emerging technologies, expanding database to support knowledge transfer of advanced-reactor related documents, and continuing to provide funding opportunities.
    - Recently GAIN worked with an independent non-profit organization called Third Way to develop images for use by nuclear industry stakeholders to show the possibilities of nuclear technology in everyday scenarios. These are free to use, provided that the user references GAIN and Third Way.
  - Office of Nuclear Energy update:
    - DOE supports industry codes & standards development through focused research and committee participation by subject matter experts.
    - DOE interacts with key stakeholders to identify and address high priority codes and standards issues.
    - Currently, DOE is active on Advanced Non-Light Water Reactors, specifically looking at high temperature reactors. DOE is working on ASME task groups for ASME Section III, Division 5, and is highly supportive of NRC endorsement of the code.
    - DOE also has on an I&C Cybersecurity program that is supporting research to inform standards and is participating on international standards collaboration efforts. Specifically, DOE is supporting IAEA, IEEE and ANS standards in the field.
- The topic of Advanced Manufacturing (AM) technology was discussed by American National Standards Institute (ANSI) (ML18256A368) and the NRC (ML18256A369).
  - ANSI
    - ANSI is collaborating with America Makes, which is the Nation’s leading and collaborative partner in AM and 3D printing technology research, discovery, creation, and innovation. The goal of the collaboration is to coordinate and accelerate the development of industry-wide additive manufacturing standards and specifications,

- consistent with stakeholder needs, and thereby facilitate the growth of the additive manufacturing industry.
  - Stakeholders include multiple sectors including energy, automotive, instrumentation, and manufacturing.
  - The collaborative has completed a, “Standardization Roadmap for Additive Manufacturing,” which identifies published and in-development standards and specifications, assesses gaps, makes recommendations for priority areas where there is a perceived need for additional standardization.
  - Also published a “Standards Landscape” that is a list of standards directly or peripherally related to the issues described in the roadmap.
  - Working groups assessed the life cycle of an AM part to identify and update gaps in standards and to engage additional industries in the SDO arena.
  - The collaborative is considering next steps to include promoting the roadmap and, tracking progress on gaps, both providing it to SDOs and providing it online, and holding sector-specific workshops.
- NRC
  - NRC is in the early stages of developing an action plan which will include research of AM techniques and to increase understanding of repeatability and control of AM processes, quality and inspectability of AM-made parts, and service performance, degradation mechanisms, and aging of AM-made parts.
  - The plan will address NRC readiness for regulatory review of AM-made parts, provide for NRC-interoffice coordination, and to continue engagement with codes and standards organizations.
  - While NRC is working on the action plan, NRC is developing an understanding of AM; collaborating with multiple stakeholders including EPRI and DOE, and others through workshops and conferences; and participating in codes and standards activities.

The 2018 Standards Forum was a success in that the participants identified process improvements for how topics are identified and prioritized. In addition, through discussions from the SDOs, participants are made aware of the needs for more partnerships between stakeholder groups to ensure that topics are introduced in a timely manner and are developed with the required knowledge to develop standards. These discussions can lead to standards with wide ranging support that are more easily utilized by the NRC and licensees.

It is anticipated that the next NRC Standards Forum will be scheduled for September 2019. In the interim, RES/DE/RGGIB will work with the Forum participants to address the action items.

ENCLOSURES:

Enclosure 1 - 2018 Standards Forum Agenda	(ML18260A334)
Enclosure 2 - Meeting Participants 2018 Standards Forum	(ML18260A335)
Enclosure 3 - 2018 NRC Standards Forum Action Item List	(ML18260A336)
Enclosure 4 - Standards Forum Topics List	(ML18256A371)

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