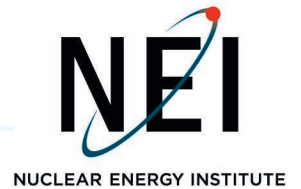


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**Project Number: 689**

**Subject:** Consolidated Industry Comments to NRC Regulatory Issue Summary 2023-02, "Scheduling Information for the Licensing of Accident Tolerant, Increased Enrichment, and Higher Burnup Fuels"

The Nuclear Energy Institute (NEI)<sup>1</sup>, on behalf of its members, is writing this consolidated response for the information requested in the U.S. Nuclear Regulatory Commission's (NRC) Regulatory Issue Summary (RIS) 2023-02. RIS 2023-02 requested information from 10 CFR Part 50, 52, 70, 71, and 72 licensees, potential applicants, and/or Certificates of Compliance (CoC) holders to assist the NRC in determining budgetary and technical resource needs with respect to the licensing of reactor fuels with Accident Tolerant Fuel (ATF) concepts, higher burnup (HBU), and increased enrichment (LEU+) and any changes in previously announced plans to license the use of these technologies. The industry appreciates the NRC's timely reviews and approvals of recent ATF, LEU+, and HBU submittals to date and this proactive effort to request information to better plan resources for future licensing reviews.

The Inflation Reduction Act of 2022 incentivizes utilities to add carbon-free energy to the grid and utilities are considering opportunities to be more efficient while also producing more power. The NEI report entitled, "The Future of Nuclear Power – 2023 Baseline Survey," summarizes an early 2023 NEI survey to determine future activities among the nineteen NEI member companies operating 81 of the U.S. nuclear reactors. A key insight from the report was that nearly half of the sites surveyed are interested in deploying one or more of ATF fuel with higher enrichment (LEU+), adopting risk-informed loss-of-coolant accident (LOCA) methods and extended fuel cycles. The 2028-2030 timeline for the expected broad deployment of these advanced fuel technologies is dependent on establishing a streamlined licensing infrastructure by 2027 as discussed in the NRC Report entitled, "Preparedness for Accident Tolerant Fuel Licensing including Higher

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<sup>1</sup> The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.

Burnup and Enrichment.” The information from NEI’s report was developed in part to provide the information requested from the RIS questions #1-2 without divulging proprietary and/or business sensitive information related to expected licensing activities. NEI members request that the NRC use the information in the NEI report.

Response to RIS Question #1: Licensees operating nuclear power plants routinely engage with the NRC staff including plant/utility project managers in the Office of Nuclear Reactor Regulation (NRR), Division of Operating Reactor Licensing (DORL). During these engagements, utilities are communicating near- and long-term plans for license amendments related to ATF, LEU+, and HBU limits. At times, the utilities are communicating potential or aspirational licensing solutions that are subject to higher degrees of uncertainty to help support NRC’s resource planning efforts. Due to the proprietary and commercially sensitive nature of these future activities, utilities prefer to continue to convey information through already established communication pathways with the NRC staff and DORL Project Managers for effective resource planning within the NRC.

Response to RIS Question #2: Fuel vendors, including Westinghouse, Framatome, and Global Nuclear Fuels, provided their licensing plans and schedules in their voluntary responses under proprietary affidavits to NRC RIS 2019-03. Any changes to the RIS 2019-03 proprietary responses are provided during routine monthly status meetings with the NRC and communications with the NRR/DORL project manager. The expected submittal dates and list of topical reports being developed to support these fuel designs are being discussed and tracked with the NRR/DORL project manager assigned to each fuel vendor.

Response to RIS question #3: Future applications for ATF, LEU+, and HBU fuels and/or power uprates could benefit from modification or enhancement of existing NRC guidance to further risk-inform, enhance the realism and improve the clarity of regulatory expectations. Future updates to Regulatory Guide (RG) 1.183 will be informed by recent NRC developments related to the radiological release source terms from SAND2023-01313 and would benefit from the consideration of statistical input sampling approaches and/or expanded risk-informed considerations. Industry anticipates that the existing proposed NRC guidance in RG 1.183 Revision 1 will require modification and that new guidance may need to be created. As detailed in the NEI comments<sup>2</sup> submitted on draft Regulatory Guide (DG), DG-1389, the conservatism and changes incorporated in the proposed revision precludes its use by many plants interested in implementing near-term ATF design concepts, fuel burnup extension to 68 GWd/MTU (peak rod average), and U-235 enrichments up to 8.0 wt%. Furthermore, DG-1389 continues to discourage credit for suppression pool scrubbing except on a case-by-case basis with significant justification required by the licensee. SAND2023-01313 discusses and demonstrates that suppression pool scrubbing is likely in the boiling water reactor (BWR) severe accident progression and that it significantly decreases the non-noble gas airborne activity (because the vast majority of the activity would be released into the suppression pool). This phenomenon inherent to the BWR severe accident progression should be acknowledged in the guidance via the maximum

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<sup>2</sup> Industry Comments on DG-1389, “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors,” Docket ID NRC-2021-0179, ML22174A072, June 21, 2022.

hypothetical accident release fractions directly or an acceptable method should be included in the guidance to account for it downstream from the release fractions.

The proposed revision contained more conservative assumptions that further limited its effectiveness. For example, acceptable methods for calculating aerosol deposition introduced in the proposed Revision 1 do not allow credit for main steam line deposition along with credit for calculating aerosol removal from drywell sprays. Multiple BWRs currently have credit for aerosol removal from drywell sprays as well as aerosol deposition within the main steam lines (some also have condenser removal) in their licensing basis. Considering the number of BWRs currently modeling both removal mechanisms, the DG should have provided guidance for crediting both of these important mitigative features.

Furthermore, the NRC should consider updating sections of the Standard Review Plan (SRP) to reflect recent NRC communications. The following list identifies a few such changes:

- SRP Section 4.2, Appendix A to reflect Information Notice 2012-09 on required conditions to be considered when evaluating fuel assembly structural integrity under postulated LOCA or seismic conditions.
- SRP Section 4.2, Appendix B and Sections 15.4.8 and 15.4.9 to reflect issuance of RG 1.236 and withdrawal of RG 1.77 so that the NRC guidance related to the analysis requirements and acceptance criteria for a rod ejection or control blade drop analysis is consistent.
- SRP Section 15.5.1 - 15.5.2 to reflect withdrawal of RIS 2005-29 via the May 15, 2019, letter<sup>3</sup> to ensure the SRP is consistent with the NRC staff positions on the analysis of inadvertent operation of ECCS and chemical and volume control system malfunction that increases reactor coolant inventory.

RIS question #4: Like the nuclear power plants, fuel cycle facilities operating under Parts 40 or 70 routinely engage with the NRC staff including project managers in Office of Nuclear Material Safety and Safeguards (NMSS), Division of Fuel Management (DFM) and, as needed, inspectors in RII, Division of Fuel Facilities Inspection (DFFI). During these engagements, which are either initiated by the licensee or the NRC staff, fuel cycle facility representatives provide near- and long-term planned and potential activities related to license amendments, applications related to LEU+ and other activities to support advanced fuel manufacturing or government-funded fuel projects. Also, like the power plants, much of this information is proprietary and commercially sensitive and is only shared with NRC through appropriate and well-established communication channels such as the DFM Project Managers. Hence, this letter does not contain specific information from any licensed fuel cycle facility or applicant.

Response to RIS question #5: For the same reasons as stated above, this letter does not contain specific information from any current or potential Certificate of Compliance (CoC) holder. Vendors have been engaging directly with DFM project managers on their past, current, and future licensing plans with respect to transportation and storage systems for fresh fuel. The discharge of used fuel from reactors to spent fuel

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<sup>3</sup> ML19121A534

pools and then subsequently its placement into dry storage and transportation systems will occur over a period of several years after plans regulated under 10 CFR Part 50 are implemented. Any specific used fuel planning, at this point, would be purely speculative. NEI will communicate with the NRC as this planning develops in public venues such as the annual NEI Used Fuel Management Conference and through NRC's routine interactions with NEI and the Electric Power Research Institute (EPRI). NEI is also working with the NRC, on regulatory efficiency improvements stemming from NEI's November 8, 2019, White Paper<sup>4</sup>, "Defining Spent Fuel Performance Margins," that have the potential to significantly reduce the amount of licensing work associated with the transportation and storage of used fuel between now and the time that planning for these activities would be needed for ATF, LEU+, and HBU fuels.

The industry is committed to providing the NRC the necessary information to plan for future ATF, LEU+, and HBU licensing activities through appropriate channels to ensure that proprietary and business sensitive information is properly controlled. We look forward to continued coordination on these important issues.

If you have any questions, please contact me at [aac@nei.org](mailto:aac@nei.org) or (202) 557-9727.

Sincerely,



Aladar A. Csontos

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<sup>4</sup> ML19318D970