U.S. Nuclear Regulatory Commission Response to GAO-23-105997,
"Nuclear Power: NRC Needs to Take Additional Actions to Prepare to License Advanced Reactors"

U.S. Government Accountability Office (GAO) Recommendation 1: The Chairman of the NRC should direct the staff to develop procedures for establishing and managing a review schedule for an incomplete application, including applications for first-of-a-kind designs.

NRC Response: The Office of Nuclear Reactor Regulation (NRR) reviews license applications for completeness and acceptability for docketing, consistent with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR). NRR established procedures for conducting acceptance reviews in NRR Office Instruction LIC-117, "Acceptance Review Process for New Nuclear Facility Licensing Applications," dated January 28, 2021 (Agencywide Documents Access and Management System Accession No. ML20283A188). NRR considers a license application to be acceptable for docketing and review upon the U.S. Nuclear Regulatory Commission (NRC) staff's conclusion that the application reasonably appears to contain sufficient technical information, both in scope and depth, for the agency to complete the technical review in a predictable timeframe. In certain rare circumstances the NRC may docket for review an incomplete application, for example, a first-of-a-kind design that the NRC staff would not normally find to be sufficiently complete for docketing. Under these circumstances, the application would not contain sufficient information to establish a predictable review schedule. In such a case, the NRC staff could establish interim schedule milestones for portions of the application that contain sufficient information for review but would not be able to provide a comprehensive review schedule until such time as the applicant has supplemented the application with sufficient information to enable the NRC staff to review the entire application in a predictable timeframe.

Based on its experience with docketing for review incomplete applications for novel and first-of-a-kind designs that were ultimately denied, the NRC expects that it would be very rare to invoke this exception in the future. If an application has technical sufficiency issues but contains sufficient information to begin the majority of the review, the NRC may begin portions of the review without making a determination that the NRC staff will accept the application for docketing. The NRC recently took this approach for the NuScale US460 standard design approval application, which was tendered but not docketed as indicated in a letter dated March 17, 2023 (ML23058A160). This is consistent with the guidance in LIC-117, Enclosure 1, "Guide to Performing Acceptance Reviews for New Reactor Licensing Applications," Section 4.0 B, "Application Not Initially Acceptable for Docketing—Acceptance Contingent on Receipt of Specific Supplemental Information."

Further, as the NRC workload increases with expected initial license application submissions, the NRC will prioritize its resources to review high-quality applications. Low-quality or incomplete applications typically consume significant resources and could divert attention and resources away from high-quality applications, resulting in potentially unnecessary schedule delays for them. The NRC has held public discussions with stakeholders including the industry, most recently on December 7, 2023, to emphasize the importance of applicants' submitting high-quality applications and the importance of the NRC's not accepting incomplete applications for docketing.

Based on the foregoing, the NRC staff is confident that its current procedures are adequate to manage incomplete applications and that it would be inconsistent with the NRC's Principles of

Good Regulations, specifically efficiency, to expend resources to develop new procedures to govern what is now considered a highly unlikely scenario.

GAO Recommendation 2: The Chairman of the NRC should direct the staff to finalize draft preapplication guidance to clarify the extent to which advanced reactor developers should participate in preapplication activities.

NRC Response: Communicating expectations on preapplication engagement with prospective applicants continues to be a priority for the agency. The NRC published draft preapplication guidance in the *Federal Register* (FR) for comment on May 25, 2023 (88 FR 33924), as Appendix A, "Pre-Application Engagement Guidance," to Draft Interim Staff Guidance (DANU)-ISG-2022-01, "Review of Risk-Informed, Technology-Inclusive Advanced Reactor Applications—Roadmap," issued May 2023 (ML22048B546). The NRC staff will finalize this guidance in early 2024 after consideration of public comments. This draft preapplication guidance covers the optimization of preapplication engagement and was discussed in several public meetings to seek stakeholder feedback before it was formally issued for public comment. The NRC published the initial draft on May 25, 2021, to provide timely guidance to new and advanced reactor developers on key areas for preapplication engagement with the NRC. Several developers, including X Energy, LLC (X-energy); TerraPower; GE-Hitachi Nuclear Energy; and Kairos Power, LLC, have used this draft guidance in their preapplication interactions with the NRC. The NRC considered the experience gained from these activities in developing the version published for public comment.

Consistent with the Commission's Policy Statement on the Regulation of Advanced Reactors (73 FR 60612), preapplication engagement is encouraged. However, preapplication engagement remains voluntary. As discussed in the NRC staff's draft guidance, preapplication engagement is particularly beneficial for new and advanced reactor developers because it allows for the early identification and resolution of technical and policy issues that could affect licensing and could enable the NRC staff to offer more predictable and shorter review schedules for new and advanced reactor license applications.

Prospective applicants have several options to engage with the NRC staff before submitting an application, including submitting white papers and topical reports to obtain written NRC feedback and support dialogue in public meetings. In the case of topical reports, the NRC provides staff determinations in written safety evaluations on the substance of each topical report that can be referenced in license applications. This process can provide a high level of regulatory predictability on key licensing and technical issues before an application is submitted. For example, Kairos used this approach successfully during its preapplication review, resulting in the establishment of an aggressive 21-month schedule for the Kairos Hermes construction permit application review. The NRC staff issued its final safety evaluation report for this project three months ahead of schedule. By relying on the NRC staff review of the first Kairos application including topical reports, where appropriate, the NRC staff established an even more aggressive 14-month schedule for the ongoing Kairos Hermes 2 construction permit application review.

The NRC previously published guidance on preapplication engagement in "A Regulatory Review Roadmap for Non-Light Water Reactors," issued December 2017 (ML17312B567). On July 12, 2019, the NRC submitted a report to Congress, "Approaches for Expediting and Establishing Stages in the Licensing Process for Commercial Advanced Nuclear Reactors" (ML19128A319), in response to the Nuclear Energy Innovation and Modernization Act. As stated in the report to Congress—

> The Roadmap provides advanced reactor designers with a clear overview of the options available for NRC review of preapplication information and of formal applications, helps define processes and interactions for various stages of the design and licensing process, and standardizes terminology and expectations. It describes multiple regulatory processes reflecting design development activities and appropriate interactions between the NRC staff and stakeholders at various stages of the reactor design process. […]
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> The Roadmap is also intended to help designers prepare technology- or design-specific [regulatory engagement plans]. A [regulatory engagement plan] describes a potential applicant's plan to engage with the NRC during the development and review of an application for a license, certification, or approval and helps define the roles and responsibilities between the NRC and the applicant at the onset of regulatory actions. Such a plan defines desired outcomes for the various interactions between the designer and the NRC, considering factors such as the technology readiness level of the reactor design, the resources available to the designer and the NRC, and the coordination of the review with the resolution of any related regulatory issues and other aspects of the overall program for developing and deploying advanced reactor designs. […]
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> In sum, the NRC has established procedures and processes for preparing and implementing [regulatory engagement plans], and applicants are following these procedures and processes.

In addition, the NRC staff has published LIC-116, "Preapplication Readiness Assessment," dated July 31, 2020 (ML20104B698), which describes the agency's process for assessing a draft application before its formal submission for NRC review. The readiness assessment is intended to facilitate efficient application reviews by allowing the NRC staff to both familiarize itself with an application and identify any technical or regulatory issues that may complicate the acceptance or technical review of an application. The readiness assessment process has been successfully executed on projects including the NuScale US460 standard design approval application (ML22305A520). The NRC staff is also leveraging the readiness assessment process for upcoming applications, including those for the TerraPower Natrium and X-energy XE-100 designs.

GAO Recommendation 3: The Chairman of the NRC should direct the staff to establish benchmarks and measures to assess the effectiveness of its recruitment, relocation, and retention strategies and incentives to assess their effectiveness to help NRC retain and hire the staff necessary to license advanced reactors.

NRC Response: The NRC has established several processes (including formal strategic workforce planning) and formulated fiscal year budget requests to ensure sufficient staff with the appropriate skill sets will be available to accomplish the anticipated workload. If the strategic workforce planning process highlights potential gaps in staffing, steps are taken to address them. The agency is currently engaged in an aggressive human capital campaign to recruit and retain the necessary staff to fulfill its mission. Additionally, the NRC is evaluating its strategic workforce planning process. This evaluation will result in recommendations for enhancing the program's effectiveness as well as refining the benchmarks and measures that will be used to continuously assess the effectiveness of the program going forward. These benchmarks and measures will consider indicators for measuring and monitoring organizational health and

performance that were provided as examples in guidance from the Office of Management and Budget in memorandum M-23-15, "Measuring, Monitoring, and Improving Organizational Health and Organizational Performance in the Context of Evolving Agency Work Environments," dated April 13, 2023. Furthermore, the NRC staff is exploring additional options to address future potential peaks in advanced reactor licensing work, including repositioning other qualified, appropriately skilled NRC staff throughout the agency to further augment advanced reactor staffing and using contractors.

To date, staffing challenges have not impacted the NRC's schedule for reviewing advanced reactor licensing actions. However, NRR has experienced some challenges to fully encumber all budgeted positions that will support future reviews for advanced reactor applications. This has required the office to employ creative near-term solutions to manage the current workload, including exercising telework flexibilities, employing rehired annuitants, engaging available contractor support, and leveraging staff in other offices for select short-term assignments. The volume of advanced reactor licensing work is expected to increase based on industry plans, therefore the agency's ability to achieve a commensurate increase in dedicated staffing resources with the requisite knowledge, critical skill sets, and experience to perform the essential work will be critical to continue to support timely reviews.

The NRC staff routinely monitors and refines benchmarks and measures to assess the effectiveness of its recruitment, relocation, and retention strategies to ensure alignment with agency hiring goals. Furthermore, NRR continues to work with the Office of the Chief Human Capital Officer to maximize opportunities to fill mission-critical, priority vacancies in a strategic, efficient, and informed manner to best ensure there are no adverse impacts to the agency's ability to fulfill its regulatory mission.

GAO Recommendation 4: The Chairman of the NRC should direct the staff to clarify in information provided to advanced reactor developers how and when they should engage with the ACRS during the licensing process.

NRC Response: The review schedules published by the NRC staff include interactions with the Advisory Committee on Reactor Safeguards (ACRS or Committee). The NRC licensing project managers are responsible for coordinating with the ACRS staff to schedule timely ACRS meetings to support the overall schedule for advanced reactor reviews. The NRC project managers also coordinate the ACRS meeting schedule with the applicant. The NRC staff and the Chair of the ACRS communicated this process to stakeholders during an advanced reactor stakeholder meeting held on July 20, 2023, to ensure that prospective applicants are aware of the process. The NRC staff also communicates this information to individual applicants and potential applicants through routine interactions, including public meetings and status calls.

As noted in GAO-23-105997, "Nuclear Power: NRC Needs to Take Additional Actions to Prepare to License Advanced Reactors," dated July 27, 2023, the NRC staff encourages design developers to seek early engagement with the ACRS. Decisions regarding how and when to engage the ACRS depend on multiple factors, including the number of unique and novel features affecting the safety of the proposed facility and the developer's desired schedule for gaining NRC approval. To assist developers in making informed decisions about Committee engagement, the ACRS has increased communication and the transparency of its review processes. Best practices guidance for ACRS members is now posted on the ACRS public website (https://www.nrc.gov/docs/ML2322/ML23227A042.pdf), specifically in the section titled "Member Guidance – III Design-Centered Subcommittee Reviews," beginning on page 10. This guidance emphasizes several aspects of the ACRS review process, such as the following:

- topical report subjects that typically warrant ACRS review
- the importance of communicating with cognizant NRC staff
- practices that make reviews more efficient

An applicant may use this information to optimize its schedule for ACRS review. ACRS members will continue to identify and make available new lessons learned as more reviews are conducted.

ACRS members and ACRS staff participate in outreach efforts regarding Committee review processes. During the last several years, members presented in public forums, such as advanced reactor stakeholder meetings, American Nuclear Society meetings, Nuclear Energy Institute conferences, and Commission briefings. During these meetings, members discuss ACRS processes related to reviewing applications for first-of-a-kind reactors with little operating experience and recent changes to improve ACRS effectiveness. In addition, the ACRS staff has issued publications regarding ACRS review processes and contributions.