POLICY ISSUE
(Information)

January 31, 2022 SECY-22-0008

FOR: The Commissioners

FROM: Andrea D. Veil, Director
Office of Nuclear Reactor Regulation

SUBJECT: ADVANCED REACTOR PROGRAM STATUS

PURPOSE:

This paper provides the Commission with an update on the U.S. Nuclear Regulatory Commission (NRC) staff's ongoing activities to make the safe use of advanced nuclear reactor technology possible. The paper informs the Commission about the progress made during 2021 on its advanced reactor licensing and readiness activities such as the resolution of key technology-inclusive policy issues, development of risk-informed and performance-based (RIPB) licensing approaches, related rulemakings, and interactions with current and prospective applicants and other stakeholders. This paper does not address any new commitments or resource implications.

BACKGROUND:

To prepare to review and regulate a new generation of non-light-water reactors (non-LWRs), the NRC staff developed the report "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-light Water Reactor Mission Readiness," issued December 2016.[1] To achieve the goals and objectives stated in that report, the NRC staff developed an implementation action plan (the plan) dated July 12, 2017.[2] The plan identified specific activities the NRC staff expects to conduct in the near-term (0–5 years), mid-term (5–10 years), and long-term (beyond 10 years) timeframes to achieve non-LWR readiness. The NRC staff has made significant

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1 See Agencywide Documents Access and Management System (ADAMS) Accession No. ML16356A670.
2 See ADAMS Accession No. ML17165A069 and ADAMS Accession No. ML17164A173.

progress over the past year on its ongoing activities to fully transition from near-term to mid- and long-term activities to support the licensing of advanced reactors. Many of these activities support readiness requirements in Section 103 of the Nuclear Energy Innovation and Modernization Act (NEIMA), which was signed into law on January 14, 2019.[3]

As required by Sections 103(b) and 103(c) of NEIMA, the NRC staff prepared reports on (1) expediting and establishing stages in the licensing process for commercial advanced nuclear reactors and (2) increasing, where appropriate, the use of RIPB evaluation techniques and regulatory guidance in licensing commercial advanced nuclear reactors within the existing regulatory framework. The NRC sent these two reports to Congress on July 12, 2019.[4] In accordance with NEIMA Section 103(a)(2), the NRC staff has developed and implemented strategies to increase the use of RIPB licensing evaluation techniques and guidance for advanced reactors within the existing regulatory framework for the resolution of policy issues. Additionally, consistent with Section 103(a)(4) of NEIMA, the NRC staff has continued efforts to establish a "technology-inclusive regulatory framework" for optional use by applicants for new commercial advanced nuclear reactor licenses. The NRC staff has also enhanced its advanced reactor technical readiness in accordance with Section 103(a)(5) of NEIMA, which requires the NRC to provide for staff training or hiring of experts to support the activities specified in Section 103(a)(1)–(4) of NEIMA, as well as to support preparations for pre-application interactions and reviews of commercial advanced reactor license applications. Further, as required by NEIMA Section 103(e), the NRC provided a report to Congress on (1) completing a rulemaking to establish a technology-inclusive regulatory framework for optional use by applicants in licensing commercial advanced nuclear reactor technologies and (2) ensuring that the NRC has adequate expertise, modeling, and simulation capabilities, or access to those capabilities, to support the evaluation of commercial advanced reactor license applications, including the qualification of advanced nuclear reactor fuel. The NRC sent this report to Congress on July 15, 2021.[5]

DISCUSSION:

As described in the plan, the NRC staff has organized its non-LWR readiness efforts into six strategic areas:

(1) staff development and knowledge management
(2) analytical tools
(3) regulatory framework
(4) consensus codes and standards
(5) resolution of policy issues
(6) communications

Since issuing the plan, the NRC staff has made significant progress in all six areas. This paper summarizes the NRC staff's key accomplishments during calendar year 2021. The enclosure provides more details on the NRC staff's activities in each strategic area during 2021, including detailed status updates for the Title 10 of the *Code of Federal Regulations* (10 CFR) Part 53, "Licensing and Regulation of Advanced Nuclear Reactors," rulemaking (Section 6.2.1) and the

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3 See https://www.congress.gov/bill/115th-congress/senate-bill/512.

4 See letter to Senators Barrasso and Pallone from Chairman Svinicki, dated July 12, 2019 (ADAMS Accession No. ML19128A289 (package)).

5 See letter to Senators Carper and Pallone from Chairman Hanson, dated July 15, 2021 (ADAMS Accession No. ML21109A263 (package)).

rulemaking on alternative physical security requirements for advanced reactors (Section 6.2.5). The NRC staff described earlier accomplishments and provided background information in four previous annual updates: SECY-18-0011, SECY-19-0009, SECY-20-0010, and SECY-21-0010, dated January 25, 2018,[6] January 17, 2019,[7] January 30, 2020,[8] and February 1, 2021,[9] respectively.

Rulemaking and Guidance Development

In 2021, the NRC staff significantly improved its readiness by prioritizing rulemaking to establish a technology-inclusive, RIPB regulatory framework and develop associated guidance for advanced reactors. The NRC staff made considerable progress towards developing a transformative, clear, and reliable, yet appropriately flexible, framework with regulations encompassing various attributes of advanced reactor technologies. This rulemaking would create 10 CFR Part 53, keeping with the NRC vision and strategy report and the statutory provisions in NEIMA Section 103(a)(4). The 10 CFR Part 53 framework recognizes technological advances in reactor design and allows credit in the form of operational flexibilities when an advanced reactor design can show increased margins of safety, including slower transient response times and relatively small and slow release of fission products. The 10 CFR Part 53 rulemaking leverages the transformative methodology commonly known as the Licensing Modernization Project (LMP), which is described in NEI 18-04, Revision 1, "Risk-Informed Performance-Based Technology Inclusive Guidance for Non-light Water Reactor Licensing Basis Development," issued August 2019.[10] The NRC staff reviewed the LMP approach in NEI 18-04 and determined it's an acceptable methodology for licensing novel non-LWR technologies in Regulatory Guide 1.233, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-light-Water Reactors," issued June 2020.[11] The NRC staff subsequently prepared the Part 53 rulemaking plan (SECY-20-0032, "Rulemaking Plan on 'Risk--Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors (RIN-3150-AK31; NRC-2019-0062),"[12] and noted the NRC staff's intent to build upon the LMP approach to develop the rule.

In 2021, the NRC staff held a series of public meetings to engage stakeholders and the Advisory Committee on Reactor Safeguards (ACRS) in developing the draft proposed rule for Commission consideration. The NRC staff spent over 80 hours in 12 public meetings on Part 53 and over 80 hours in 13 meetings with the Advisory Committee on Reactor Safeguards Full Committee and the Future Plant Designs Subcommittee. Over 170 public comment submittals have been received on the preliminary proposed rule language. In response to stakeholder feedback, the NRC staff has made several changes to the preliminary proposed rule, such as eliminating the originally proposed "two-tier" structure of the safety criteria to enhance clarity and other changes outlined in the enclosure. Most notably, the NRC staff is developing additional options to provide deterministic alternatives to 10 CFR Part 53, with the objective of providing additional flexibility for a wide range of reactor designs. In the first option, the NRC staff is developing an alternative to the probabilistic risk assessment-led methodology in 10 CFR Part 53 preliminary proposed rule language. This alternative deterministic option more

6 See ADAMS Accession No. ML17334B184.
7 See ADAMS Accession No. ML18346A075 (package).
8 See ADAMS Accession No. ML19331A712.
9 See ADAMS Accession No. ML20345A239 (package).
10 See ADAMS Accession No. ML19241A472.
11 See ADAMS Accession No. ML20091L698.
12 See ADAMS Accession No. ML19340A047.

closely aligns with licensing methodologies used in international standards to allow flexibility for future applicants. This alternative was discussed at an October 28, 2021, public meeting. For the second option, the NRC staff has established a working group to develop a dose-based deterministic approach. The NRC staff discussed this effort at an advanced reactor stakeholder meeting on November 10, 2021. The NRC staff is planning additional public meetings with stakeholders, including nongovernmental organizations, in 2022 to specifically solicit input on the rulemaking.

Based on the stakeholder feedback described above, the NRC staff requested a nine-month extension to the current schedule for the 10 CFR Part 53 rulemaking in October 2021. The NRC staff requested the extension to address several issues that the NRC staff had identified as key challenges in its November 2020 memorandum to the Commission.[13] Those issues included (1) providing additional time for the NRC staff to continue interactions with external stakeholders and further develop rule language, (2) allowing additional time for external stakeholders to participate constructively in the rulemaking process, and (3) ensuring better coordination with other NRC advanced reactor activities. On November 23, 2021, the Commission approved the NRC staff's extension request. Under the approved extension, the NRC staff will provide the Part 53 proposed rule package to the Commission by February 2023 and provide the final rule package, including key guidance, to the Commission by December 2024. The NRC staff is expecting to issue the final rule by July 2025, which is well ahead of the NEIMA requirement of December 2027. Further details about the basis for the schedule extension can be found in a note to Commissioners' Assistants, "Proposed Revisions to Schedule Milestones for Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors (Part 53) Extension Request."[14]

As part of the 10 CFR Part 53 rulemaking, the NRC staff is creating a transformative security framework for advanced reactors. The NRC staff is applying a graded approach to a comprehensive range of security areas, including physical security, fitness for duty, access authorization, and cybersecurity, commensurate with the risk to public health and safety.

The NRC staff is conducting additional rulemakings on emergency preparedness (EP) and physical security and is developing an Advanced Nuclear Reactor Generic Environmental Impact Statement (ANR GEIS) and associated rulemaking.

The rulemaking on EP for small modular reactors (SMRs) and other new technologies (ONTs) would amend the NRC's regulations to add alternative EP requirements for facilities such as non-LWRs and non-power production or utilization facilities. The rule would create a new subsection, 10 CFR 50.160, which would adopt a scalable plume exposure pathway emergency planning zone approach and an RIPB, consequence-oriented, and technology-inclusive EP framework. In establishing the new EP framework, the NRC staff performed extensive stakeholder outreach, responding to over 2,000 comments that it considered in developing the final rule proposal. The 10 CFR Part 53 rule language will allow applicants to choose between (1) a deterministic approach under the existing EP regulatory framework in 10 CFR 50.47, "Emergency plans," and in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and (2) a performance-based approach under the proposed final rule on EP for SMRs and ONTs in the new 10 CFR 50.160. The NRC staff recognizes the importance of effective guidance to support the new EP framework and is issuing the companion Regulatory

[13] See ADAMS Accession No. ML20288A240.
[14] See ADAMS Accession No. ML21333A222.

Guide 1.242 with the draft final rule on EP for SMRs and ONTs. The NRC staff submitted the draft final rule and associated guidance for Commission consideration on January 3, 2022.

The limited scope physical security rulemaking, which is separate from the security portion of the 10 CFR Part 53 rulemaking, would establish voluntary alternative physical security requirements and opportunities to credit security by design under the existing regulatory framework in 10 CFR Parts 50 and 52, commensurate with the potential consequences to public health and safety and the common defense and security. The proposed rulemaking package is due to the Commission in June 2022.

The ANR GEIS proposed rule would amend 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions", to codify the findings of the draft ANR GEIS. The ANR GEIS uses a technology-neutral regulatory framework and performance-based values and assumptions to determine those environmental impacts that could result in the same (generic) impact for different advanced nuclear reactor designs that fit within the parameters set forth in the ANR GEIS and those environmental impacts that would require a project-specific analysis. The NRC staff submitted the draft ANR GEIS and associated draft proposed rule for Commission consideration on November 29, 2021.[15]

In 2021, the NRC staff interacted extensively with stakeholders and conducted over 30 public meetings, including meetings with the ACRS, to obtain feedback on the rulemakings, to establish the advanced reactor regulatory framework, and to implement NEIMA requirements. Moving forward, the NRC will continue to streamline and optimize the advanced reactor regulatory framework as part of its effort to be a modern, risk-informed regulator. To this end, the NRC staff is developing options for a regulatory framework for fusion energy systems, as required by NEIMA. In April 2021, the NRC staff issued a white paper titled "Preliminary Options for a Regulatory Framework for Fusion Energy Systems,"[16] which it plans to submit for Commission consideration in the fall of 2022. In addition to fusion technologies, the NRC staff is addressing micro-reactor licensing and other policy issues with industry and other stakeholders. For example, on September 3, 2021, the NRC staff released a draft white paper outlining optional strategies for streamlining micro-reactor licensing.[17]

Furthermore, the NRC staff has initiated a rulemaking to align the licensing requirements of 10 CFR Part 50 and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." This rulemaking would increase consistency between reviews of new reactor license applications under 10 CFR Part 50 and reviews of those under 10 CFR Part 52. The NRC staff expects this rulemaking to reduce the need for exemptions and license amendment requests. The NRC staff published the regulatory basis for initiating the rulemaking effort in Volume 86 of the *Federal Register*, page 7513, on January 29, 2021. The NRC staff is currently preparing the proposed rulemaking package, which it will submit for Commission consideration in May 2022.

The NRC staff is developing draft interim staff guidance, as well, for the safety review of construction permit (CP) applications for all light-water reactor (LWR) designs, including designs similar to those recently reviewed under 10 CFR Part 52; it expects to receive such applications in 2023. The interim staff guidance discusses the regulatory requirements for a CP and the level of detail required for a preliminary safety analysis report. It includes an appendix that clarifies and supplements NUREG-0800, "Standard Review Plan for the Review of Safety

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15 See ADAMS Accession No. ML21222A044 (package).
16 See ADAMS Accession No. ML21118A081.
17 See ADAMS Accession No. ML21235A418.

Analysis Reports for Nuclear Power Plants: LWR Edition," to add more information on preliminary design reviews. The NRC staff issued the draft interim staff guidance for public comment in a *Federal Register* notice in December 2021[18]. Although outside the scope of the advanced reactor program, these 10 CFR Part 50 and 10 CFR Part 52 activities are being coordinated with a similar effort to develop guidance for advanced reactor applicants applying under the Part 50 and Part 52 licensing processes. Coordination of these LWR and advanced reactor guidance activities provide an example that demonstrates how the NRC staff is implementing its vision across programs.

In 2021, the NRC staff has also continued a number of other activities that support advanced reactor licensing. Over the last 5 years, the NRC staff has been cooperating with industry project leaders on the LMP, which has moved on to the next phase with the development of performance-based guidance through the Technology Inclusive Content of Application Project (TICAP) and the Advanced Reactor Content of Application Project (ARCAP). In 2021, the NRC staff participated in four tabletop exercises with the industry to demonstrate the use of the TICAP draft guidance to develop portions of the license applications describing the safety cases for the Westinghouse Electric Company eVinci micro-reactor design, the TerraPower Molten Chloride Reactor Experiment design, the X Energy LLC (X-energy) Xe-100 high-temperature gas-cooled reactor design, and the Versatile Test Reactor sodium-cooled metallic-fueled pool-type fast reactor design. Additional NRC staff activities in 2021 include endorsement of consensus codes and standards, activities related to fuel qualification and to operator licensing and staffing, and development of an inspection and oversight framework for non LWRs.

Analytical Tools

To ensure readiness to review advanced reactor designs, the NRC staff continues to assess design information, experimental data, and analytical tools needed for non-LWR reviews. In 2021 the NRC staff completed a series of five volumes and an introductory report documenting a comprehensive plan for developing computer code capabilities to support non-LWR reviews. This plan describes the overall code development approach, the codes themselves, knowledge gaps, and necessary development activities. The NRC staff continues to develop proof-of-concept reference plant models for plant systems and accident progression and source term analysis; it expects to complete four additional models in 2022 beyond the six models completed in 2021.

The NRC staff released several other documents related to codes and standards in 2021. In June 2021, the NRC staff released for public comment a draft NUREG-2246 containing a proposed fuel qualification methodology as guidance for non-LWR developers on fuel qualification under NEIMA.[19] In August 2021, the NRC staff released for public comment the draft regulatory guide DG-1380, "Acceptability of ASME Code, Section III, Division 5, 'High Temperature Reactors'"[20]; the draft NUREG-2245, "Technical Review of the 2017 Edition of ASME Code, Section III, Division 5, 'High Temperature Reactors'";[21] and the preliminary trial use regulatory guide for endorsement of consensus codes and standards. On September 24, 2021, the NRC staff released for public comment the draft NUREG-2159,

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18 Federal Register Volume 86, Number 237 (Tuesday, December 14, 2021)] [Notices] [Pages 71101-71102] [FR Doc No: 2021-27035]

19 See ADAMS Accession No. ML21281A128.

20 See ADAMS Accession No. ML21091A277.

21 See ADAMS Accession No. ML21223A097.

Revision 1, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control Plan Required for Special Nuclear Material of Moderate Strategic Significance."[22]

Licensing Activities

The NRC staff is increasing pre-application engagement, including the technical review of numerous topical reports on advanced reactor issues, with applicants participating in the U.S. Department of Energy (DOE) Advanced Reactor Demonstration Program (ARDP). In October 2020, the DOE selected two teams, one led by X-energy and the other by TerraPower, to receive initial funding for ARDP demonstration projects. Both X-energy and TerraPower are submitting documents for pre-application reviews, which will support applications proposed for X-energy in 2022 and TerraPower in 2023. In addition, in December 2020, the DOE selected five teams to receive initial funding under the ARDP's Risk Reduction for Future Demonstration Projects program, as well as three U.S. based teams to receive funding under the Advanced Reactor Concepts-20 program.

In 2021, the NRC staff began the review of the Kairos Power Fluoride Salt Cooled, High Temperature Non-Power Reactor (Hermes) CP application. The NRC received the CP application for Kairos' Hermes reactor in two parts on September 29 and October 31, 2021. The NRC staff completed its acceptance review of both parts of the application and docketed the CP application for detailed review on November 29, 2021. The NRC staff provided Kairos with an estimated 21-month review schedule based, in part, on Kairos' substantial pre-application engagement on new and novel design features. As part of pre-application engagement with Kairos on the Hermes reactor and Kairos' power reactor technology, the NRC staff completed the review of six topical reports from Kairos and is nearing the completion of four more topical reports, which will contribute to enhanced predictability and efficiency in the Hermes CP application review. During 2021, the NRC staff continued to engage with Oklo Power LLC on the Aurora combined license (COL) application to obtain missing technical information needed to establish a detailed review schedule and reach safety findings required for licensing the facility. However, on January 6, 2022, the NRC denied, without prejudice, the Oklo COL application, based on Oklo's failure to provide information on several key topics for the Aurora design.[23]

The NRC staff continues to implement flexible and multi-staged non-LWR regulatory review processes to engage with other non-LWR developers. In the past year, the NRC staff has engaged with non-LWR developers on reviews of five white papers and four topical reports from X-energy on its pebble bed high temperature gas-cooled reactor; four white papers from Terrestrial Energy on its molten salt reactor; three white papers and one topical report from TerraPower on its sodium-cooled fast reactor; one white paper from General Atomics on its helium-cooled fast reactor design; and four white papers from Westinghouse on the eVinci micro-reactor design. In May 2021, the NRC staff published a draft white paper, "Pre-application Engagement to Optimize Advanced Reactors Application Reviews," to provide information to advanced reactor developers on the benefits of robust pre-application engagement in order to optimize both safety and environmental application reviews.[24] The NRC staff continues to seek information from prospective near-term applicants to ensure that technology-inclusive readiness activities will support the nuclear industry's plans.

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22 See ADAMS Accession No. ML21263A119.

23 See ADAMS Accession No. ML21357A034.

24 See ADAMS Accession No. ML21145A106.

Furthermore, there is growing interest in licensing new research reactors and testing facilities, including facilities using advanced reactor technologies, at university sites. For example, within the next few years Abilene Christian University plans to submit an application for a molten salt (liquid-fueled) non-power research reactor, and the University of Illinois plans to submit an application for a high-temperature gas reactor testing facility. The NRC staff is conducting pre-application activities for both projects.

The NRC staff is conducting pre-application interactions to support the fuel cycle for advanced reactor technologies, including X-energy's proposed fuel fabrication facility to produce tristructural isotropic (TRISO) fuel. In a letter dated October 26, 2021, Kairos Power notified the NRC staff of its plans to apply for a possession and use license for a Category II fuel fabrication facility under the regulations in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material." The facility is expected to be located near the Hermes reactor and will manufacture TRISO fuel to support reactor operations. Kairos Power expects to submit the license application for the fuel fabrication facility to the NRC by the third quarter of calendar year 2022.

In June 2021, the NRC staff approved a license amendment authorizing American Centrifuge Operating, LLC, a subsidiary of Centrus Energy Corporation, to demonstrate commercial production of high-assay low-enriched uranium (HALEU) at its Piketon, OH, fuel enrichment facility.[25] The NRC staff is conducting pre-application interactions with four commercial vendors on near-term production of HALEU for advanced reactor fuels. These interactions have included informal exchanges and one formal letter of intent[26] concerning license applications or amendments to permit HALEU production. The NRC has received and is reviewing several initial licensing requests for the enrichment, fabrication, and transportation of HALEU, and it anticipates receiving HALEU related license amendments applications from existing facilities.

The NRC staff is continuing its licensing activities for light-water SMRs. The final safety evaluation reports for the last two new light-water reactor design certifications (i.e., APR-1400 and NuScale SMR designs) have been issued within the 42-month schedule. This is consistent with NEIMA's expectations on completing reviews in accordance with established schedules. In 2021, the NRC staff's efforts included the NuScale design certification rulemaking and pre-application activities for: (1) the NuScale NPM20 standard design approval (including the VOYGR 12/6/4-pack modules), (2) the General Electric-Hitachi Nuclear Energy BWRX-300, and (3) the SMR LLC (Holtec) SMR160 designs. These vendors are addressing key technical and policy issues that the NRC staff is reviewing through topical reports in order to ensure timely and efficient application reviews. Additionally, during 2021, the NRC staff gathered lessons learned from both internal and external stakeholders associated with the NuScale design certification review and is currently evaluating these lessons in order to implement identified opportunities for improvement.

External Coordination and Communication

The NRC staff has established a memorandum of understanding with the DOE and the U.S. Department of Defense (DOD) Strategic Capabilities Office on the mobile micro-reactor demonstration program (Project Pele). In 2021 the NRC staff engaged in pre-application discussions with the Air Force, which has expressed interest in potentially obtaining an NRC license for a stationary micro-reactor to produce power for Eielson Air Force Base in Alaska. In 2022, the NRC staff will continue to work cooperatively within the bounds of its statutory

[25] See ADAMS Accession No. ML21138A827.
[26] See ADAMS Accession No. ML21292A180.

authority with the DOE, the Fusion Industry Association, and other stakeholders to develop, for Commission consideration, a framework for regulating commercial fusion facilities. Likewise, the NRC staff will continue to work cooperatively within the bounds of its statutory authority with counterparts at the DOE and DOD on projects such as Project Pele. The NRC's work on these projects continues to yield information that supports the NRC's ability to carry out its mission with respect to new, developing technologies.

Under the scope of the NRC's memorandum of cooperation (MOC) with the Canadian Nuclear Safety Commission (CNSC),[27] the NRC staff has worked with the CNSC on several cooperative reviews, advanced reactor and SMR technical review approaches, and pre-application activities. In June and August 2021, the NRC and the CNSC issued their first joint reports under the MOC. The June report documented the collaborative activities on X-energy's reactor pressure vessel construction code assessment for its Xe 100 design[28] and the August report documented a comparison of the U.S. LMP with the Canadian regulatory approach.[29] In 2021, the NRC and CNSC worked to identify new collaborative projects under the MOC, and in October 2021 signed a work plan to establish a common regulatory position on TRISO fuel qualification. The NRC and the CNSC mutually agreed to invite the UK's Office for Nuclear Regulation (ONR) to observe the collaborative activities for TRISO fuel and the ONR accepted. Besides that, the NRC and CNSC are developing joint reports that address specific technical aspects of Terrestrial's Integral Molten Salt Reactor and GE Hitachi's small modular reactor BWRX 300.

Furthermore, in 2021, the NRC staff continued its mutually beneficial engagements with the international community on technical and regulatory issues for new technologies, participating in the SMR Regulators' Forum at the International Atomic Energy Agency (IAEA) and in the Working Group on the Safety of Advanced Reactors at the Nuclear Energy Agency. The NRC staff is also collaborating with the IAEA on the IAEA's ongoing assessment of the applicability of current safety standards to advanced reactors and novel technologies.

The status of the NRC's advanced reactor readiness activities is available on the agency's public Web site (https://www.nrc.gov/reactors/new-reactors/advanced.html). To increase visibility and clarity, the Web site provides an integrated schedule showing the regulatory activities within each strategy. This schedule is updated before each periodic advanced reactor stakeholders' meeting.[30] The Web site is maintained and updated regularly to increase transparency and access to information for stakeholders. The NRC staff has upgraded the NRC's public Web site and expanded its internal knowledge management activities through Nuclepedia, SharePoint tools, and other internal communications as well.

Staffing and Future Plans

In 2021, the NRC staff continued to fill vacancies and increased organizational capacity to support the projected workload consistent with available resources. The NRC continues to develop expertise to prepare to review advanced reactor applications effectively and efficiently. By establishing strong, diverse teams, adapting the organization, and leveraging and sharing data, the NRC staff has reached key milestones in each of the six strategic areas. To enhance project management capacity and agility, the NRC staff is expanding the use of the core team

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27 See ADAMS Accession No. ML192750578.
28 See ADAMS Accession No. ML21166A304.
29 See ADAMS Accession No. ML21225A101.
30 See https://www.nrc.gov/reactors/new-reactors/advanced/adv-rx-integrated-schedule.pdf.

approach for reviews of advanced reactors (including non-power reactors that use advanced reactor technology) and building review teams that include non-power reactor and advanced reactor licensing staff.

In 2022, the NRC staff will focus on numerous high-priority, mid- and long-term activities consistent with the integrated schedule. The NRC staff will continue to work on the 10 CFR Part 53 rulemaking; activities associated with the EP and security rulemakings, fusion technologies, and other actions required by NEIMA; the advanced reactor GEIS; TICAP and ARCAP guidance; and the inspection and oversight framework. The NRC staff will continue its review of the Kairos Power Hermes CP application, as well as conduct pre-application engagement with ARDP selectees and other developers. Other high-priority activities include guidance development and endorsement of consensus codes and standards. As part of the NRC's goal of building strong partnerships, optimizing resource use, and leveraging experience, the NRC staff will continue to collaborate with the DOE on projects such as the Versatile Test Reactor; with the DOD on Project Pele; and with the CNSC, IAEA, Nuclear Energy Agency, and other international counterparts.

CONCLUSION:

In 2021, the NRC staff made substantial progress towards enabling the deployment of advanced reactor technologies, completing key readiness activities in each of the plan's six strategic areas. The NRC is building an agile, sustainable program for regulating advanced reactors and developing expertise and tools to prepare for advanced reactor licensing and oversight without imposing unnecessary regulatory burden. Going forward, the NRC is well positioned to review additional non-LWR license applications and will continue to interact with prospective applicants and developers to ensure complete, high-quality, and timely license applications. The NRC staff will continue to engage proactively with stakeholders, collaborate with other Federal agencies, and pursue further opportunities to cooperate with international counterparts to fully leverage technical resources to resolve non-LWR regulatory and policy challenges.

The NRC staff will keep the Commission informed of the status of its readiness activities, plans for potential licensing applications, and advanced reactor policy topics and will seek Commission decisions where appropriate.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objections. The Chief Financial Officer reviewed this package has determined that it has no financial impact.

Andrea D. Veil

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Andrea D. Veil, Director
Office of Nuclear Reactor Regulation

Enclosure:
Non-Light-Water Reactor Implementation Action Plan Progress Summary and Future Plans

SUBJECT: ADVANCED REACTOR PROGRAM STATUS DATED: January 31, 2022

SRM-M170511-4

ADAMS Accession Nos.: ML21337A377 Package
ML21337A376 SECY
ML21337A378 Enclosure **SECY-012**

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