ADDENDUM NO. 8 TO THE

MEMORANDUM OF UNDERSTANDING

BETWEEN UNITED STATES DEPARTMENT OF ENERGY AND NUCLEAR REGULATORY COMMISSION ON NUCLEAR ENERGY INNOVATION

Enabling Cooperative Use of Modeling and Simulation Tools

I. Purpose and Scope

On October 7, 2019, the United States (U.S.) Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) (hereinafter the "parties" or "party") entered into a Memorandum of Understanding on Nuclear Energy Innovation (Nuclear Innovation MOU) to coordinate DOE and NRC technical readiness and to facilitate the sharing of technical expertise and knowledge on advanced nuclear reactor technologies and nuclear energy innovation, including the activities related to research, development, demonstration, and commercial application by the civilian nuclear industry of safe and innovative nuclear technologies.

To ensure the proper sharing of technical expertise and information between DOE and the NRC, this Eighth Addendum (Addendum) to the Nuclear Innovation MOU addresses the technical coordination of DOE and the NRC regarding research activities related to the cooperative use and development of modeling and simulation tools and techniques in support of advanced nuclear reactor safety.

These various research activities are coordinated by the NRC's Office of Nuclear Regulatory Research and across several Program Offices at DOE's Office of Nuclear Energy (DOE/NE), chiefly DOE/NE-5 (Reactor Fleet and Advanced Reactor), and also including DOE/NE-4 (Nuclear Fuel Cycle and Supply Chain) and DOE/NE-8 (Spent Fuel and Waste Disposition).

The cooperation between DOE and the NRC will balance the need to ensure the NRC's independence to avoid compromising its regulatory role with the respective responsibilities of each agency to cost-effectively develop the technical bases for the safe and secure operation and regulation of nuclear energy facilities.

This Addendum does not alter the authorities or independence of the NRC and DOE or their abilities to fulfill their responsibilities under their respective jurisdictions.

II. Authority

DOE and the NRC enter into this Addendum to the MOU pursuant to Section V. Organizational Implementation and Section VII. Commencement, Modification, and Termination of the Nuclear Innovation MOU.

III. Background

The NRC and DOE both conduct research activities associated with the development of simulation tools. The NRC develops simulation tools to obtain independent information for use in making timely regulatory judgments, anticipating and resolving safety significant issues, and developing technical bases to support regulatory positions. The DOE develops simulation tools to aid the development and deployment of nuclear energy technologies, including generation, safety, waste storage and management, and security technologies to help meet energy security, proliferation resistance, and climate change goals. This includes tools that provide insight and explore improvements to light water reactor systems and fuel forms to further enhance safety and operational performance. The DOE also conducts research to develop new and advanced reactor designs and technologies that enable new reactor technologies, improve nuclear energy's competitiveness, and help advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs.

Both the NRC and DOE participate in bilateral and multilateral international cooperative research programs. Although the goals of the NRC and DOE research programs differ in many respects, fundamental data and technical information obtained through joint research activities is recognized as an area of mutual interest and an opportunity to conserve resources and avoid duplication of efforts. Accordingly, it is in the best interest of both parties to cooperate and share data and technical information and, in some cases, the costs related to such research, whenever such cooperation and cost-sharing may be done in a mutually beneficial fashion.

IV. Roles and Responsibilities of Each Party

This Addendum identifies cooperative activities centered around the sharing of information and research activities. This will be generally accomplished as follows:

1. Programmatic and Technical Information Exchanges. NRC and DOE will plan and facilitate the exchange of information concerning the objectives, milestones, approaches, and experimental data and results for their ongoing research activities. Information exchange meetings will be held, virtually or in-person, as needed. During these meetings, both parties will provide updates for ongoing research, including activities related to, but not limited to:

    - Development of advanced modeling and simulation (M&S) computer codes that can be used to analyze the operation and performance of light water reactors, small modular reactors, and advanced non-light water reactors (non-LWRs). Examples include but are not limited to development of specific computer codes, code coupling and interoperability methods, code verification (to ensure code developments are implemented correctly), code validation (to assess codes against data), and user training. This may also include incorporation of analytical models developed by one agency within the computer codes of the other agency.
    - Development of M&S strategies for Physical Security and Material Control and Accounting (MC&A) to inform safeguards and security requirements.

- Development of technology-specific reference plant models from available design information. The purpose of this effort is to test the codes and models and identify and correct errors ahead of future licensing support.
- Development of interoperability between DOE's Nuclear Energy Advanced Modeling and Simulation (NEAMS) computer codes with the NRC's safety analysis computer codes.

2. Potential Joint NRC/DOE Sponsored Research and/or Training Activities. NRC and DOE will cooperate, when appropriate, in the identification of additional areas of mutual interest for joint cooperative research, workshops, and/or training activities.

The primary roles and responsibilities of each organization are described below.

DOE

DOE will provide oversight and direction of its own work, funding authorization, and mission objectives. DOE will coordinate with NRC on the scope, objectives, research results, and associated funding of mutually agreed cooperative research and/or training activities.

The following are anticipated DOE Roles and Responsibilities:

- DOE will identify points of contact (POCs) to coordinate DOE-NRC information exchanges and cooperative research and/or training activities.
- As appropriate, DOE will provide the NRC with all relevant programmatic and technical information on its experimental and analytical research activities.
- As appropriate, DOE will continue to develop and maintain its NEAMS computer codes and models to ensure that they support the NRC's plant modeling needs, and it will continue to provide the NRC with access to, and training on, these computer codes.
- As appropriate, DOE will continue its diligent verification and validation efforts to establish a sufficiently high level of confidence in its NEAMS computer codes, recognizing that end users such as the NRC will do additional validation for their specific needs, and DOE will provide the NRC with access to the validation data and documents as needed.
- As appropriate, DOE will provide the NRC with access to data, documents, and insights that can support the NRC's role as an independent regulator to conserve resources and avoid unnecessary duplication of effort.

NRC

NRC will provide oversight of and direction for its own work, funding authorization, and mission objectives. NRC will coordinate with DOE on the scope, objectives, research results, and associated funding of mutually agreed cooperative research and/or training activities.

NRC will neither make recommendations regarding specific commercial design or facility concepts nor participate in any DOE selection process.

The following are the anticipated NRC Roles and Responsibilities:

- NRC will identify POC(s) to coordinate DOE-NRC information exchanges and cooperative research and/or training activities.
- As appropriate, NRC will provide programmatic and technical information to DOE that inform DOE's research efforts in experimental and analytical activities.
- As appropriate, NRC will provide feedback from use of computer codes, modeling tools, and reference plant model development to DOE that inform DOE's research efforts in experimental and analytical activities.
- As appropriate, NRC will provide DOE with accurate and current information on NRC's regulations, licensing, and certification processes, and/or information needs that would support NRC's safety assessments.

V. Funding Authorization

This Addendum is neither a fiscal nor a funds obligation document and does not authorize expenditure or reimbursement of appropriated funds. To the extent activities discussed in this Addendum would require resources beyond the NRC's existing appropriated authorities, the parties may agree to enter into Implementing Interagency Agreements (IAAs), supplemental to the MOU and this Addendum, that address such activities.

VI. Organizational Conflicts of Interest

DOE and the NRC are aware of the organizational conflict of interest requirements and obligations of the respective agencies under those requirements including Section 170A of the Atomic Energy Act of 1954, as amended. DOE and the NRC will work together to resolve any organizational conflicts that may arise.

NRC Authorizing Official:

DOE Authorizing Official :

Alice K. Caponiti Digitally signed by Alice K. Caponiti Date: 2023.06.21 15:02:25 -04'00'

Raymond Furstenau, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

Date: 6-22-2023

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