

**ADDENDUM**  
to  
**MEMORANDUM OF UNDERSTANDING**  
between  
**U.S. NUCLEAR REGULATORY COMMISSION**  
and  
**U.S. DEPARTMENT OF ENERGY**  
on  
**COOPERATIVE USE of MODELING AND SIMULATION TOOLS**

**I. INTRODUCTION**

The U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) are parties to a Memorandum of Understanding on Cooperative Nuclear Safety Research dated May 1, 2014 (the MOU). Pursuant to the MOU, to conserve resources and avoid needless duplication of effort, the Parties agreed 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. This Addendum to the MOU (the Addendum) is entered into by and between NRC and DOE effective as of the date of signature of the last of the Parties to execute this Addendum (the Effective Date).

This Addendum to the MOU is authorized pursuant to section V(a)(iii)(d) of the Principles of Cooperation of the underlying MOU. The terms and provisions of the MOU are controlling for all activities under this Addendum. This Addendum does not obligate or commit funds and does not provide for the transfer of funds. The parties to this Addendum will be responsible for their own expenses, if any, incurred under this Addendum.

This Addendum describes an agreement between NRC's Office of Nuclear Regulatory Research (RES) and DOE's Nuclear Energy (NE) for the cooperative use of modeling and simulation tools to support licensing of advanced reactor applications and to help facilitate eventual industry use of modeling and simulation tools. The principal areas of interaction will be between NE's Modeling and Simulation Programs, namely, Nuclear Energy Advanced Modeling and Simulation (NEAMS) and Energy Innovation Modeling and Simulation Hub (the Hub) and NRC's RES.

The Hub was established in July 2010 for five years to develop advanced modeling and simulation (M&S) tools that can be used to analyze issues associated with operation of U.S. commercial light water reactors (LWRs). In January 2015 it was extended for an additional five years with the goal of finalizing development of the pressurized water reactor (PWR) analysis tools and extending the program's tools for use in analysis of boiling water reactor (BWR) and small modular reactors operations.

The NEAMS program develops advanced modeling and simulation capabilities used by scientists and engineers in research, design, and analysis of nuclear power systems. NEAMS developers work with the nuclear engineering community to provide the tools they need to enable the next generation of nuclear technologies. The NEAMS Toolkit comprises a suite of computational modules that rely on fundamental, mechanistic descriptions of the laws of physics governing the performance and safety of reactor systems and their associated fuels.

## **II. OBJECTIVES**

This cooperative program has the following specific objectives:

The main interest of the NRC's RES is to investigate the interoperability of the Hub and NEAMS codes with the NRC's TRACE (NRC's thermal-hydraulics code). NRC and the DOE teams are currently working together to initiate a "test stand" or pilot project using the Hub and NEAMS M&S codes for NRC use in analyses of Accident Tolerant Fuels (ATF) and advanced non-light water reactors.

1. The primary objective of this test stand is to make NRC's TRACE code interoperable with Hub and NEAMS codes.
2. Hosting a test stand will enable the NRC to become familiar with the Hub and NEAMS products, and in doing so investigate problems of importance to the NRC.

## **III. SCOPE and PLAN**

This program may include a wide variety of collaborative activities including information exchange meetings, support for expert panels, jointly sponsored projects, and research aimed at achieving the preceding objectives.

## **IV. PERIOD OF PERFORMANCE**

The initial period of performance will be consistent with the MOU period of performance, to be extended in writing if mutually agreeable to NRC/RES and DOE/NE.

## **V. PROJECT DIRECTION AND COORDINATION**

All technical interactions will be managed through a single designated point of contact for each Party (the Project Contacts). Technical meetings to coordinate this effort and to discuss project progress will be arranged through the respective Project Contacts that are listed below:

NRC  
Stephen Bajorek  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission

DOE  
Tansel Seleker  
Office of Nuclear Energy  
U.S. Department of Energy

**VI. AGREEMENT**



Michael F. Weber, Director  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission



R. Shane Johnson  
Deputy Assistant Secretary for  
Nuclear Technology Demonstration and  
Deployment  
Office of Nuclear Energy  
U.S. Department of Energy

13 February 2018

Date

12/20/2017

Date

13 February 2018  
Effective Date

