

ADDENDUM
to
MEMORANDUM OF UNDERSTANDING
Between
U.S. NUCLEAR REGULATORY COMMISSION
And
ELECTRIC POWER RESEARCH INSTITUTE
On
COOPERATIVE NUCLEAR SAFETY RESEARCH

I. Introduction

This Addendum to the Memorandum of Understanding (the Addendum) is entered into by and between the U.S. Nuclear Regulatory Commission (NRC) and the Electric Power Research Institute (EPRI) effective as of the date of signature of the last party to execute this Addendum (the Effective Date). The NRC and EPRI are parties to the Memorandum of Understanding on Cooperative Nuclear Safety Research (the MOU, found under Enclosure 1). Pursuant to the MOU, the parties agreed to encourage cooperation in nuclear safety research which provides benefits for NRC, the nuclear power industry (the Industry), and the public.

This Addendum to the MOU is authorized pursuant to Section 31 of the Atomic Energy Act (AEA) and/or Section 205 of the Energy Reorganization Act (ERA). The terms and conditions of this Addendum to the MOU should not be interpreted in a manner inconsistent with and shall not supersede applicable Federal laws and regulations.

This Addendum describes a cooperative research program in the area of advanced manufacturing between EPRI and the NRC's Office of Nuclear Regulatory Research (RES), Office of New Reactors (NRO), and Office of Nuclear Reactor Regulation (NRR). For the purpose of this Addendum, advanced manufacturing is defined as the improvement of the manufacture of products by use of new, novel technology and improved processes with a focus on techniques and material processing methods that have not been traditionally used in the U.S. nuclear industry nor formally standardized by a codes & standards organization used in the nuclear industry.

II. Objectives

The specific objective of this MOU addendum is to aim for the timely exchange of information (e.g., objectives, milestones, technical data, and results) on planned and ongoing advanced manufacturing research activities between the NRC and EPRI.

The objective of the EPRI Advanced Manufacturing R&D projects are to develop: 1) improved, cost effective, safe manufacturing and fabrication processes, 2) supporting mechanical and metallurgical property data, and 3) pertinent technical information which can be shared with ASME, NRC and industry regarding the following disciplines:

- Manufacturing and fabrication of Small Modular Reactor (SMR) components cooperatively developed between EPRI and US Department of Energy. Specific technologies can include: powder metallurgy-hot isostatic pressing, electron beam welding, diode laser cladding, etc.
- Additive Manufacturing (AM) using laser powder bed AM approaches for the manufacture of structural and pressure-retaining components.
- Adaptive feedback welding using the gas tungsten arc welding process aimed at full automation of the welding process.
- Other advanced manufacturing methods that can be targeted toward advanced reactor (GEN IV) development.

The objectives of the NRC activities in the area of Advanced Manufacturing research projects are to 1) develop a technical knowledge base for the review of safety-related components created by advanced manufacturing methods and 2) utilize this technical knowledge base to develop a generic regulatory framework for the evaluation and acceptance of such components at NRC regulated facilities. NRC is interested in understanding, from its perspective as an independent safety and security regulator, how to evaluate the performance and degradation/aging effects of structures, systems and components (SSCs) fabricated via advanced manufacturing, relative to those produced by traditional methods. NRC is also interested in optimizing its ability to inspect such SSCs at manufacture and in service; therefore, the NRC would have particular interest in monitoring and non-destructive examination (NDE) of these SSCs. NRC would also participate in codes & standards activities as appropriate and perhaps in reviewing the development of a materials certification framework.

III. Roles and Responsibilities

EPRI	<ul style="list-style-type: none"> - Participate in joint NRC/EPRI web conferences (typically on a quarterly basis) - Provide data and information (as available) from R&D projects on advanced manufacturing - Provide questions and comments to the NRC on the generic regulatory framework being developed for the evaluation and acceptance of AM-made SSCs at regulated facilities
NRC	<ul style="list-style-type: none"> - Participate in joint NRC/EPRI web conferences (typically on a quarterly basis) - Provide status on NRC research activities in the areas of advanced manufacturing - Provide updates and status on the development of a generic regulatory framework for the evaluation and acceptance of AM-made SSCs at regulated facilities

IV. Scope and Plan

This program includes a variety of collaborative activities (including information exchange meetings, support of expert panels, and potential jointly-sponsored projects and testing) aimed at achieving the objectives. The program elements are as follows:

1. Programmatic Information Exchange. Both the NRC and EPRI will exchange information concerning the objectives, milestones, and planned approaches for their ongoing advanced manufacturing research tasks. Programmatic information exchange meetings will be held on a quarterly basis. These meetings will be held verbally or in-person; written exchanges of information will be performed as appropriate to maintain NRCs role as an independent regulator.
2. Technical Information Exchange. Both the NRC and EPRI plan to facilitate the exchange of technical information needed to progress with each party's advanced manufacturing research tasks. This task will also include periodic updates for ongoing EPRI sponsored research in this area. Technical information exchange meetings will generally be held in conjunction with the programmatic information exchange on a quarterly basis. One of those meetings will be dedicated specifically to bringing in external organizations or experts to describe their research as it reaches sufficient maturity. During these meetings, the NRC will include updates on information related to the development of a regulatory framework for the inspection of these components. The NRC will also facilitate communications between other government agencies with relevant experience in advanced manufacturing such as the Federal Aviation Administration (FAA) and the US Navy. These meetings will be held verbally or in-person; written exchanges of information will be performed as appropriate and in a manner which maintains NRC's role as an independent regulator.
3. Potential Joint NRC/EPRI Sponsored Projects. NRC and EPRI will continue to jointly participate, when appropriate, in the identification of additional areas of mutual interest for joint collaborative activities in advanced manufacturing that will be addressed in separate addenda or agreements.

V. Period of Performance

The initial period of performance will be from the Effective Date for up to 5 years from the agreement date signed in X below, to be extended in writing if mutually agreeable to EPRI and the NRC.

VI. Project Direction and Coordination

While the Addendum Contacts will work on high-level issues related to the Addendum, the individuals each party designates as the point of contact for each project will manage all technical interactions. The respective POCs will arrange all technical meetings to coordinate this effort and to discuss project progress. The Addendum POCs are:

<p>EPRI David Gandy Senior Technical Executive, Nuclear Materials Electric Power Research Institute 1300 W.T. Harris Blvd Charlotte, NC 28262 980-428-3567 davgandy@epri.com</p>	<p>NRC Jason Christensen/RES Jason.Christensen@nrc.gov Amy Hull/RES Amy.Hull@nrc.gov</p>
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VII. Costs and Schedule

EPRI and the NRC plan to be responsible for their respective costs in implementing this Addendum. The costs of this cooperative program are associated with the support of:

1. Quarterly technical information exchange meetings
2. Working meetings between researchers
3. Responses to data requests
4. Other activities identified under Section III, above


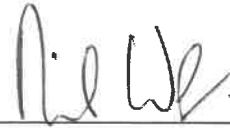
VIII. Availability of Funds

The NRC and EPRI's ability to carry out the activities of this MOU Addendum is subject to the availability of appropriated funds. It is also understood that the goals herein agreed to are feasible according to the best understanding of the parties regarding resources and costs.

IX. Disputes

If a dispute arises out of or relating to this Addendum, or any breach thereof, the parties will first attempt to settle the dispute through direct negotiation between the Addendum Contacts. If the Addendum Contacts cannot settle such a dispute, the parties shall submit the dispute to the Senior Management Contacts (as defined in the MOU) for resolution.

X. Agreement

	<u>7-25-19</u>		<u>8-6-2019</u>
Raymond V. Furstenau Director of Nuclear Regulatory Research	Date	Neil Wilmshurst Vice President and Chief Nuclear Officer	Date