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NUCLEAR ENERGY INSTITUTE

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William J. Boyle, Ph.D.
Acting Deputy Assistant Secretary
Office of Spent Fuel and Waste Disposition
U.S. Department of Energy
Office of Nuclear Energy
1000 Independence Ave., S.W.
Washington, DC 20585

Subject: Sixth Update to the Industry's Research and Development Priorities Specific to the Long-Term Dry Storage and Transportation of Used Nuclear Fuel

Dear Dr. Boyle:

The Nuclear Energy Institute (NEI)[1] greatly appreciates the U.S. Department of Energy's (DOE) continued willingness to engage with the industry in the planning of research and development (R&D) activities in support of the long-term dry storage of used nuclear fuel. On May 8, 2019, the joint DOE/industry working group on this topic held its sixth interaction in conjunction with the NEI Used Fuel Management Conference in West Palm Beach, FL (the 5th update is described in my letter to you dated June 28, 2018). At the most recent meeting it was decided to further update the list of industry recommendations on which used fuel R&D activities should receive the highest priority.

Attachment 1 to this letter provides the updated priority ranking. This update comes at a time when industry is working with NRC to develop a more risk informed regulatory framework. Therefore, we have chosen to focus on those R&D activities that inform improved understanding of dry storage and transportation safety margins.

The R&D programs on this priority list continue to be of significant value to the industry as renewal applications for site-specific dry storage licenses and certificates of compliance (CoCs) from the U.S. Nuclear Regulatory Commission (NRC) are, increasingly, relying on the results of these R&D programs. Of particular

[1] The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.

importance to industry is the completion of ***all phases*** of the High Burnup Fuel (HBF) Dry Storage Research Project (Priority #1), up to and including opening of the full size cask. Even though thermal challenges within the cask have been found to be significantly less than originally anticipated, industry still sees significant value in the fuel examinations that can only be conducted if the cask can be opened.

We commend the Department for its collaborative efforts on these programs. They have already spurred the development of new technology in the private sector. This is particularly true with respect to Mitigation/Repair/Inhibitor technologies (Priority #3) and non-destructive evaluation techniques (Priority #7). Going forward, in these two areas, we expect focus to shift towards transitioning to implementation and production.

It is expected that industry, as well as NRC, interest in this ongoing collaboration will continue to remain strong. My colleagues on the joint DOE/industry working group and I look forward to continuing to work with you to advance these important R&D activities. Please do not hesitate to contact me if you have any questions.

Sincerely,

Rod McCullum

Attachment

c: Michael Layton, NMSS/DSFM, NRC
Ned Larson, DOE

Updated Industry Research and Development Priorities Specific to the Long-Term Dry Storage and Transportation of Used Nuclear Fuel

June 2019

Tier I Priorities – Research and Development (R&D) that is Directly Linked to Existing Aging Management Commitments and supports a more risk informed approach to assuring long term safety

1. Completion of all phases of the HBF Dry Storage Research Project and related HBF fuel testing, including development of hot cell capability sufficient to open the full size cask that has been loaded at North Anna and completion of the testing program of the sister rods that have been removed from the North Anna assemblies. The importance of cask opening and stored rod examination is not in any way lessened by recent data obtained from the project indicating fuel temperatures are lower than expected. This work is vital irrespective of these results – i.e., improved understanding of thermal conditions is not a substitute for direct and thorough visual examination of the fuel.
2. Development of improved methodologies for state-of-the-art best-estimate thermal analyses that would enable better understanding of actual cask conditions during loading operations, quantify thermal margins, improve licensing of thermal models of dry cask storage systems, and inform communications addressing the differences between conservative licensing estimates and actual temperatures. Effort should build on results from High Burnup Demonstration Project and separate-affects tests to provide a better understanding of the behavior of all types of cladding under conditions of long-term storage and subsequent transportation. This work can be used to inform Phenomena Identification and Ranking Tables (PIRTs). Initially PIRTS should be limited to only those related to thermal analyses. The use of PIRTs in other areas should be discussed between DOE and industry prior to implementation.
3. Development of mitigation methods, repair techniques and inhibitors that can be deployed, in situ, to address degradation of stainless steel canisters at ISFSI sites.

Tier II Priorities – R&D that Will Significantly Support Existing Aging Management Programs

4. Evaluation of methods for canister acceptance testing after transportation. Specifically work supporting helium leakage testing on aged spent fuel canisters after arrival at a Consolidated Interim Storage or Repository site.
5. Analysis of the potential consequences of corrosion and cracking of stainless steel canisters at ISFSI sites. Efforts should include:
    a. Acquisition of additional data on how environmental conditions affect potential crack initiation times for Stress Corrosion Cracking (SCC) on stainless steel canisters,

b. Experimental data gathering on real cracks in simulated canisters,

c. Refinement of corrosion modeling capabilities,

d. Evaluation of the effects of air or water ingress into a canister on the cladding,

e. Improved characterization of potential release mechanisms,

f. Consideration of the effects of cladding defects and crud on cladding.

6. Broad scope transportation activities to assure readiness for the removal of used fuel from reactor sites beginning in 2023, as currently anticipated based on the schedules and progress of the two ongoing Consolidated Interim Storage initiatives (in Texas and New Mexico).
7. Development of minimally-invasive volumetric non-destructive evaluation (NDE) technologies and delivery systems for in-situ inspection of stainless steel canisters at ISFSI sites, while minimizing radiation dose to workers.
8. Development of sensor technology to monitor the condition of the cask internals (i.e., helium concentration over time) without the need for confinement penetrations.
9. Further development and demonstration of dry transfer capability that can be mobilized for deployment ISFSI sites.

Tier III Priorities – R&D that Could Potentially Benefit Existing or Future Aging Management Programs or Will Significantly Address Related Industry Objectives

10. Acquisition of additional data on the performance of neutron-absorbing materials, assembly hardware, and other internal dry storage system components in long-term storage and subsequent transportation.
11. Acquisition of data and performance analyses on degradation of bolts, seals and cask body materials in bolted systems (this work should be coordinated with international efforts in this area).