UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 16, 2018

The Honorable Fred Upton
Chairman, Subcommittee on Energy
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

The U.S. Nuclear Regulatory Commission appeared before the Committee on Energy and Commerce on February 6, 2018, at the hearing entitled, “DOE Modernization: Advancing the Economic and National Security Benefits of America’s Nuclear Infrastructure”. From that hearing, you forwarded questions for the hearing record to Mr. Victor McCree. The responses to those questions are enclosed.

If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

/RA/ Eugene Dacus

Eugene Dacus, Director
Office of Congressional Affairs

Enclosure:
As stated

cc: The Honorable Bobby L. Rush, Ranking Member
Subcommittee on Energy

House Energy and Commerce, Subcommittee on Energy
Hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure"
February 6, 2018
Questions for the Record

Chairman Fred Upton
(Questions for Mr. McCree)

QUESTION 1. **High-assay LEU, uranium enriched at higher levels than what is typically available in the current commercial market, may be needed for advanced reactor technology developers to ultimately deploy and commercialize their reactor designs. A recent industry survey of 16 leading U.S. advanced reactor technology developers found the lack of access to high-assay LEU ranks at the top of policy concerns that require resolution to move forward with those projects. Has the NRC considered potential policy challenges associated with this material?**

ANSWER.

The NRC does not see any insurmountable policy challenges associated with licensing or regulating this material. High-assay Low Enriched Uranium (LEU) is considered to include enrichments up to 20%. The NRC has regulations that would allow for the licensing of uranium enrichment facilities to produce these higher assay materials. These materials could come from NRC-licensed domestic enrichment facilities, the Department of Energy (DOE), or foreign sources.

The NRC would leverage its past experience licensing new technologies such as the facilities intended to produce Molybdenum-99 medical isotopes. The requirements for the existing

enrichment and fuel fabrication facilities regarding high-assay LEU could be established through rulemakings, issuance of orders, or through license conditions.

Although not NRC policy challenges, there are some issues the industry would need to address to facilitate the production of high-assay LEU and the fabrication of fuel using high-assay LEU. Uranium enrichers will produce the high-assay LEU in the form of uranium hexafluoride and ship it to fuel fabricators to be made into reactor fuel. Shipping packages for each different form of the high-assay LEU (i.e., uranium hexafluoride and fresh reactor fuel) would need to be developed and certified. Additionally, there is currently a lack of criticality benchmarks, used in the verification of criticality computer codes, for uranium enrichments at the high-assay LEU levels. Without these benchmarks, additional safety precautions would have to be added to ensure that an inadvertent criticality does not occur. The additional safety precautions could impact the design of the transportation packages as well as the facilities producing and using the high-assay LEU (e.g., smaller packages, less throughput in plant systems, etc.).

QUESTION 2. **DOE, in partnership with the Electric Power Research Institute and other industry partners, is working to develop what is known as "Accident Tolerant Fuels" or ATF. ATF could be a game changer for existing nuclear power plants by significantly reducing the risk of an emergency release and therefore results in corresponding reductions in regulatory requirements. How is NRC considering potential technical and policy issues that may have to be addressed to qualify these fuels?**

ANSWER.

In consideration of potential technical and policy issues related to implementation of Accident Tolerant Fuels (ATF), the staff has drafted a project plan (ADAMS Accession ML17325B771) that outlines the strategy to license ATF designs in the near-term and the longer-term. The draft plan covers all aspects of ATF, including fabrication, transportation, storage, and the regulatory framework for in-reactor performance. The draft plan contains tasks covering regulatory infrastructure needs (regulations and guidance), tools and methods for safety evaluations, and accounts for interactions with industry, the DOE, and international organizations regarding appropriate experimental data and code capabilities for regulatory decision processes. The draft plan was published in the *Federal Register* for public comment with nearly 80 comments from 10 entities received. The staff discussed comments with stakeholders during a February 27, 2018, public meeting (ADAMS Accession ML18057A189). The staff anticipates incorporating stakeholder feedback and finalizing the plan by mid-summer 2018. The plan is intended to be a living document and will evolve as ATF concepts are refined.

QUESTION 3. **Advances in super computing and application of new modeling techniques provide great opportunity to drive innovation and develop new nuclear technologies, particularly to help qualify new nuclear fuels. However, to realize the full benefits of modeling and simulation, the NRC must be prepared to analyze and accept the data.**

a) How is the NRC considering its level of preparedness to analyze and accept modeling and simulation for fuel qualification?

b) What are some of the obstacles NRC faces to realize the benefits of advanced computing?

ANSWER.

a) Throughout the history of licensing nuclear technologies, the NRC has approved applications that rely on a combination of computer simulation, modeling, and experimental data to demonstrate compliance with NRC safety requirements. Consistent with past practice, the NRC supports the appropriate use of computer models and simulation tools to evaluate the safety of nuclear technologies.

The NRC has been meeting with representatives from the DOE, national labs, the Electric Power Research Institute, and international organizations to define how their current and planned advanced modeling and simulation capabilities can be used for fuel qualification and how they will be validated against relevant data to ensure that they appropriately model physical processes and accurately predict the results of phenomena of interest.

The NRC is actively engaged in leveraging existing advanced modeling and simulation to advance our codes and build our staff expertise in advanced computing. For example, over the last 6 months, DOE has sponsored several training opportunities for the NRC staff and provided NRC access to a number of DOE codes. Additionally, NRC and DOE code development experts are exploring linking NRC and DOE codes and developing greater understanding of code capabilities and analysis needs. The efforts initiated to date have been productive.

b) The main challenge NRC faces to realize the benefits of advanced computing is related to code verification and validation. For advanced modeling and simulation tools, there is a need to reach a common understanding of (1) the level of rigor of verification and validation and (2) the experimental and empirical basis supporting validation when these advanced modeling

and simulation tools are used to support safety decisions. The NRC looks forward to working with proponents of advanced computing to support regulatory safety decisions, such as fuel qualification.

QUESTION 4. **The state of Texas has petitioned the NRC to have the regulatory authority to regulate a potential GTCC disposal site in the State. While NRC regulations require GTCC is disposed of in a geologic repository, I understand that a Texas company has expressed interest in a near-surface disposal facility. Please provide an update on the status of NRC's activities relating to GTCC waste disposal.**

ANSWER.

In 2015, the Commission directed the NRC staff to prepare a regulatory basis for the disposal of Greater-than-Class-C (GTCC) waste through means other than deep geologic disposal, including near-surface disposal. Additionally, the Commission directed that the regulatory basis should analyze whether, in accordance with section 274c.(4) of the Atomic Energy Act, disposal of GTCC waste presents a hazard such that the NRC should retain authority over its disposal. If the staff concludes, as a result of its analysis, that some or all GTCC waste is potentially suitable for near-surface disposal, the staff is directed to proceed with the development of a proposed rule to include disposal criteria for licensing the disposal of such waste under 10 CFR Part 61.

The NRC staff is continuing to gather relevant information to develop the GTCC regulatory basis. On February 14, 2018, the NRC published a *Federal Register* notice (83 Federal Register 6475) requesting stakeholder comments on identifying the various technical issues that should be considered in the development of the regulatory basis. Comments have been requested to be submitted by mid-April 2018. The NRC staff also held a public meeting and

webinar on February 22, 2018, to discuss the various technical issues that the NRC staff should consider. Approximately 100 stakeholders participated, including industry representatives, a Congressional staff-member, other Federal Executive agencies, environmental groups, Agreement States, and other members of the public. An additional public meeting on the disposal of GTCC and transuranic waste was held on March 23, 2018, shortly after the 2018 Waste Management Symposia in Arizona.

After development of a draft regulatory basis, the NRC staff plans to hold additional public meetings this summer. The NRC staff plans to publish the final regulatory basis in early 2019.