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

CHAIRMAN

May 2, 2014

Ms. Priscilla Star
Coalition Against Nukes, et al.
c/o Garry Morgan, Secretary
BEST/MATRR
P. O. Box 241
Scottsboro, AL 35768

Dear Ms. Star:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), thank you for your letter dated February 25, 2014, which followed our January 23, 2014, meeting regarding, among other topics, high burnup fuel issues. The NRC is committed to its mission of protecting the health and safety of the public, the common defense and security, and the environment. The Commission appreciates the information that you have provided regarding regulation of transportation and storage of spent nuclear fuel. The NRC staff has considered this information, but at this time does not believe a change in existing Commission policy is warranted.

In your letter, you recommended several items for NRC action in relation to high burnup fuel. Please find enclosed the NRC staff's response to each item.

You indicated in your letter that you are preparing a petition for rulemaking and asked the NRC to follow steps outlined in Gretel Johnston's factsheet, "MAKE RADIATION VISIBLE," to increase public confidence and safety. Information about the petition for rulemaking process is available on our public Web site at http://www.nrc.gov/about-nrc/regulatory/rulemaking/petition-rule.html. The NRC staff will address those issues through the petition for rulemaking process.

Thank you for your interest in this matter.

Sincerely,

Allison M. Macfarlane

Enclosure:
As stated

cc: G. Stone, Residents Organized for a Safe Environment (ROSE)
M. Resnikoff, Radioactive Waste Management Associates (RWMA)

G. Johnston, Mothers Against Tennessee River Radiation (BEST/MATRR)
S. Shapiro, Indian Point Safe Energy Coalition (IPSEC)
T. Judson, Nuclear Information and Resource Service (NIRS)
D. Gilmore, Coalition to Decommission San Onofre
D. D'Arrigo, Nuclear Information and Resource Service (NIRS)
G. Morgan, Bellefonte Efficiency & Sustainability Team (BEST/MATRR)

Stop approval of high burnup fuel (HBF) use

The NRC has increased the maximum fuel burnup it permits as our understanding of the changes the fuel undergoes in the reactor core has advanced. Our understanding of those changes is an important consideration in our safety decisions. Burnup is one of the many parameters that are both considered in designing the fuel and core and evaluated throughout the plant operating cycle to verify that design-specific limits are met. Included in these parameters are fuel rod growth, internal pressure, and clad creep, which, in turn, are dependent on burnup. Predictive tools, which are based on data that indicate actual fuel performance, are used to evaluate these parameters over the operating cycle. Throughout the operating cycle, testing is done to confirm key physics parameters are consistent with predictions. When a new fuel is designed, its use is limited by the data available to support the associated predictive models. As such, burnup is limited for a particular fuel by the predictive models and the availability of data supporting these models. The fuel is required to meet all safety limits at all times in the operating cycle. There is no safety basis to discontinue approving high burnup fuel.

Stop approval of HBF dry cask storage

Based on testing in the laboratory and modeling, the NRC staff believes that high burnup fuel can be safely stored. The NRC staff has not seen any data from either domestic or international sources that contradict this position. We appreciate the information you provided relative to high burnup fuel. The NRC has considered this information, but it does not provide cause, in our judgment, to change our position.

The NRC believes that current regulations for spent fuel storage are adequate to ensure public health and safety and protection of the environment. Available information indicates that both low and high burnup spent fuel can be stored and transported safely. This information comes from operational experience with storage systems as well as tests. Considerable data are available on the properties of low burnup spent fuel and more confirmatory data are being obtained daily on high burnup fuel. Those data are instrumental in enabling the NRC to make licensing decisions to allow spent fuel storage in specific dry cask designs. For further information on this, please see the backgrounder on high burnup spent fuel on our public Web site at http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-high-burnup-spent-fuel.html.

Make solving high burnup fuel storage problems one of its highest priorities

The NRC continues to focus on the safety and security of all spent nuclear fuel storage. As part of our work, we continue to evaluate the safety of spent fuel storage by conducting our own research as well as monitoring related activities around the world. In your letter, you expressed concern that the "Demonstration Project" being developed by the U.S. Department of Energy (DOE) and the Electric Power Research Institute (EPRI) was not a solution to high burnup fuel storage problems. This Demonstration Project, being managed by DOE through contracts with the EPRI and several DOE national laboratories, is one of those activities that we believe can provide important information on such topics as fuel cladding behavior that depends on the temperature and atmosphere that the fuel experiences, drying procedures that are generic in

nature, and confirmation of thermal modeling capabilities. This information will be useful to the NRC to better understand and confirm the performance of high-burnup fuels in storage.

Develop adequate strategies to detect and mitigate unexpected degradation during dry storage

The NRC staff agrees with this recommendation and we have undertaken certain activities to accomplish this. The NRC's regulations in Title 10 *Code of Federal Regulations* Part 72 require that all storage license renewals have either a time-limited aging analysis or an aging-management plan in place for all components that can affect the safety of the system. Central to a time-limited aging analysis or an aging-management plan is the availability of operational data that indicate whether the condition of the system is generally the same as when the system was originally constructed or whether degradation from either known or unknown mechanisms is occurring. NRC is in the process of determining the capabilities of the variety of available examination techniques, analyzing potential degradation mechanisms, and drafting guidance for preparing the aging-management plans that discuss the frequency of the systems inspection, how to inspect the systems, what to look for during inspection, and the criteria used to determine a safety concern. Justifications for these determinations will also be required. In addition, aging-management plans will take into consideration data relevant to addressing the degradation that was obtained on other similar systems or on systems using similar materials operating under the same operating conditions. Development of this guidance is a high priority for the agency.

Absent a comprehensive safety analysis, not approve 32 assembly casks for HBF, such as the NUHOMS® 32PTH2 cask system

As in all applications for cask certification, the NUHOMS® 32PTH2 required a comprehensive safety analysis and received a complete safety review by the NRC. The proposed rule to include NUHOMS® 32PTH2 cask system in the "List of Approved Spent Fuel Storage Casks" will be published in the *Federal Register* for public comment in April 2014. Whenever a new cask design or an amendment to a currently approved cask design is submitted for approval, the complete system (in the case of a new application) or the effects of the changes (in the case of an amendment) are given a comprehensive safety review. A team of NRC employees with expertise in the areas of structural analysis, criticality, shielding, thermal analysis, materials, containment evaluation, quality assurance, and inspection is assembled to conduct the review. The review determines whether the pertinent safety regulations are met; if needed, additional information is requested of the licensee before a safety evaluation is completed. Once the NRC staff is satisfied that the safety requirements are met, the findings are documented in a safety evaluation report, including restrictions or operating conditions that may be placed on the approval for use. The public is given the opportunity to review the analysis and comment on the safety evaluation before the NRC makes its final decision. If a new design or amendment to a design is determined not to meet the pertinent safety requirements, the design is not approved.

Require all HBF assemblies be containerized in damaged fuel cans for dry storage

As stated earlier, based on testing in the laboratory and modeling, the NRC staff has determined that high burnup fuel can be safely stored. The NRC staff has not seen any data from either domestic or international sources that contradict this position. While NRC regulations allow canning (i.e., placing the fuel in a container) as a means of addressing grossly damaged fuel in storage to contain the fuel in a known volume in the cask, available information indicates high burnup fuel integrity will be maintained during storage without canning. Therefore, there is no safety basis to require canning of all high burnup fuel.

Require full cask testing, rather than computer simulations and scale models

Scale-model tests provide sufficient information to support NRC safety assessments. Although full-scale tests on some real, representative cask systems could provide useful information, prototype testing is usually conducted only for small packages. Larger packages (such as spent fuel packages) are often complex, and prototype testing is not always practical. By contrast, the relatively smaller sized scale models are easier to handle and can be tested for various drop orientations. The scale-model drop tests are effective in providing the necessary and sufficient information for cask evaluation. They help determine accurately the maximum impact forces imparted to the cask body, model, or prototype. Once the maximum impact forces on the cask body are available, cask designers use computer simulations to perform detailed structural analyses of the cask body, including closure bolts, and cask internals such as the canister, basket, and the fuel assemblies. The accuracy and applicability of computer simulations have been proven in automotive, aircraft, nuclear, civil, and mechanical systems and are well documented and widely accepted. The cask designers and the NRC have used computer simulations in the same manner as practitioners in those engineering disciplines to evaluate cask performance. Based on the cask designers' efforts and NRC oversight activities, the NRC staff believes that the current practice of scale-model drop tests and the detailed computer simulations provide reasonable assurance that spent fuel casks can operate safely.

Reject NUREG-2125 Spent Fuel Transportation Risk Assessment as inadequate as it does not address HBF

While NUREG-2125 concentrated on spent fuel with a burnup of 45 gigawatt-days per metric ton of uranium (GWd/MTU), the effect of including higher burnup fuel was discussed in Section 6.3. Most of the results of NUREG-2125 are not affected by transporting higher-burnup spent fuel (the surface dose rate is the same). The only cases in which higher-burnup spent fuel would change the numerical results are the very low-probability accident scenarios involving rail casks containing spent fuel without an inner canister that may result in release. In these cases, the results would not change by more than an order of magnitude, and the conclusions would not change at all. Furthermore, NUREG-2125 shows that high burnup fuel has no impact on the results for casks using inner canisters because there are no releases from these casks, even under the severe accident conditions analyzed.