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August 15, 2013

Ms. Cindy K. Bladey
Chief, Rules, Announcements, and Directives Branch (RADB)
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Industry Comments on Draft Spent Fuel Storage and Transportation Interim Staff Guidance No. 24 (SFST-ISG-24) *The use of a demonstration program as confirmation of integrity for continued storage of high burnup fuel beyond 20 years* – Docket ID NRC-2013-0140

Reference: Letter from Rod McCullum to Mark Lombard, *Industry Analysis and Confirmatory Information Gathering Program to Support the Long-term Storage of High Burnup Fuel (HBF)*, March 22, 2013, ML13084A045

Project Number: 689

Dear Ms. Bladey:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)[1] welcomes the opportunity to comment on the subject draft Interim Staff Guidance (ISG). The subject addressed by the ISG is of significant interest to the industry as we now begin to enter a period where the loading of high burnup fuel (HBF) into dry storage will become increasingly common.[2] As indicated in the referenced letter, the industry believes that there is a strong existing technical basis for the dry storage of HBF over extended time periods, and we intend to employ the results of an HBF dry storage demonstration program—as currently

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

[2] To date, there has been relatively little experience with dry storage of HBF, and no HBF has experienced extended periods of dry storage. The majority of HBU fuel in dry storage has been loaded in the past 6 years, with only a small amount having been loaded earlier. Thus far approximately 6% of the fuel loaded into dry storage is HBF with approximately 18% of the loaded dry storage systems containing some HBF. However, in the future, the emplacement of HBF into dry storage is likely to become much more common as most used fuel currently being discharged from reactors is now HBF.

being developed through a partnership between the U.S. Department of Energy (DOE) and the Electric Power Research Institute—to further confirm this technical basis. Applicants for dry storage license renewals involving HBF will make reference to this program in their submittals as surrogate confirmatory information supporting their aging management plans. Therefore, there is significant utility in providing guidance to NRC staff for use in considering this information in reviewing these submittals. As such, we concur with the NRC's decision to develop an ISG addressing this topic.

However, the currently proposed ISG-24 does not provide guidance to NRC staff on how to use information obtained, or planned to be obtained, through a demonstration program in the NRC's review of dry storage license renewal applications, but rather states specific technical requirements that would apply to the conduct of the HBF demonstration program itself. An ISG is not an appropriate vehicle for establishing new regulatory requirements. And furthermore (as reflected in our specific comments on the ISG in the attachment to this letter), the requirements stated in the ISG are often overly prescriptive and would be problematic to implement. In this regard, the current proposal is both premature and misplaced.

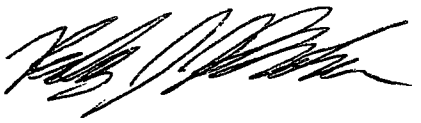
We agree that the NRC should have input to the specific technical content of the HBF demonstration program but believe that there are better vehicles for the NRC to provide its expectations than this ISG. Getting input from the NRC and others is, in fact, the very reason that the DOE intends to publish the test plan for the demonstration program for public comment this fall. We suggest that the NRC address the technical concerns currently stated in the form of requirements in this ISG as comments on the draft test plan. In this way, the test plan, which is the more appropriate vehicle for establishing the specific technical requirements for the demonstration, can be constructed in a manner that will assure the NRC's expectations are met.

We recommend that the NRC temporarily withdraw this proposed ISG until after staff has had the opportunity to comment on the draft HBF demonstration program test plan. Then, with a thorough understanding of how that program will proceed in hand, the NRC will be in a better position to establish guidance on how the staff should factor this program into their review of dry storage license renewal submittals.

Our general concern that new requirements should not be established in staff review guidance notwithstanding, we do note that the proposed ISG has offered a number of valuable insights into the NRC's position on how the HBF demonstration program should be conducted. Therefore, in the interest of helping both the industry and the NRC prepare for the coming public dialogue on the test plan, we are providing, in the attachment to this letter, specific comments on the NRC's treatment of technical issues pertaining to the program in the ISG.

We look forward to future interactions with the NRC on the HBF demonstration program. We would, of course, welcome any opportunity to meet with the NRC to further discuss our comments if necessary. Thank you in advance for consideration of our comments. If you have any questions, please contact me.

Sincerely,



Rodney McCullum

Attachment

c: Ms. Catherine Haney, NMSS, NRC
Mr. Mark D. Lombard, NMSS/DSFST, NRC
Mr. Anthony H. Hsia, NMSS/DSFST, NRC
Mr. Steve R. Ruffin, NMSS/DSFST/LB, NRC

Attachment

Specific Comments on NRC Technical Positions on the HBF Demonstration Program in Draft Interim Staff Guidance-24 (ISG-24), Revision 0

No.	Location	Comment
1.	Discussion Paragraph 3 p. 1	The phrase "2) HBF could exhibit a ductile-to-brittle transition temperature (DBTT) due to the presence of radial hydrides" is awkward. A better way of stating the issue would be "the radial hydrides could raise the cladding ductile-to-brittle transition temperature (DBTT) enough to compromise the ability of the cladding to withstand stress without undergoing brittle failure."
2.	Discussion Paragraph 3 p.1	The statement "*Research performed in Japan and the United States indicated that: 1) hydrides could reorient at a significantly lower stress than previously believed*" is not well supported by Reference 4. In Reference 4, hydride reorientation and ring compression test (RCT) for high burnup PWR Zry-4 (67 GWd/MTU) and Zirlo (70 GWd/MTU) were conducted at 140 and 110 MPa of hoop stress that is higher than the hoop stress of 90 MPa as specified in ISG-11 (see Table 5 in Reference 4 as attached in the first attachment). In addition, at least within the knowledge of industry experts, RCT testing by Japanese researchers was conducted at room temperature, resulting more radial-hydride formation than that formed at relatively high temperature such as 150°C (see slide 13 of the Kamimura presentation attached as the second attachment). High burnup PWR Zyr-4 and Zirlo fuel cladding showed more brittle behavior when tested at room or low temperature for RCT as shown in Reference 4, Table 5. However, actual cladding temperature of HBF will be higher than the room temperature during at least the initial 20 years and longer storage period. The application of Japanese data (i.e., relatively low temperature and hoop stress for re-orientation and ductile-brittle transition) could be too conservative to apply for the actual scenario of expected storage conditions.
3.	Discussion Paragraph 4 p. 2	The first sentence is awkward and difficult to follow. Suggested replacement: There is reasonable assurance that low burnup fuel can be stored safely and then retrieved over time periods well in excess of 20 years. There is no evidence to suggest that HBF cannot similarly be stored safely and then retrieved for time periods beyond 20 years, but the supporting data is not as extensive as for low burnup fuel. Therefore, confirmatory data or a commitment to obtain data on HBF ...

No.	Location	Comment
4.	Discussion Paragraph 6 p. 2	The second item ("The condition of the fuel after 20 years of storage") is unclear and inconsistent with the other items. Item 2 should be restated "The condition of the fuel after 20 years of storage does not degrade."
5.	Technical Review Guidance Paragraph 2, Item 1 p. 3	The guidance essentially sets a burnup limit of no more than 4 GWD/MTU above the burnup of fuel in the demonstration program with the same cladding type to define the applicability of the demonstration program. This is problematic for several reasons. • There is no stated basis for 4 GWD/MTU. • The point of the high burnup demonstration program is verify there are no deleterious phenomena at work in dry storage, not to establish a specific burnup limit based on one test program. • While there are a variety of cladding types and variations, all cladding currently in use is made from zirconium based alloys. Rather than setting strict and arbitrary limits, licensees should have the flexibility to demonstrate from available data, including high burnup demonstration programs, separate effects tests and analyses, that there is reasonable assurance of fuel integrity. • A prototypical high burnup fuel dry storage demonstration program is an expensive, long-lead time endeavor and there is no technical justification provided for the requirement inherent in Item 1.
6.	Technical Review Guidance Paragraph 2, Item 2 p. 3	The requirement that fuel peak cladding temperatures (PCTs) of the high burnup demonstration program bound the PCTs requested in the license application is problematic for a number of reasons. • The intent of the demonstration program is to provide representative data of typical conditions in one storage system, not to "bound" phenomena for all storage systems. • It is neither feasible nor necessary to run numerous high burnup demonstration programs in order to bound all scenarios for all cladding types for all storage systems. • It is not clear that higher temperature is bounding for all phenomena. Nor is it even clear whether the NRC's use of the term bounding is meant to be applied to the high or low temperatures. • The ISG creates uncertainty with regard to how the program's results are to be characterized. The demonstration program must meet NRC regulatory limits. How can it meet those limits (with margin and allowance for uncertainty) and at the same time set limits?

No.	Location	Comment
7.	Technical Review Guidance Paragraph 2, Item 2 p. 3	The requirement that thermal models used in licensing must benchmark the data from the high burnup demonstration program is inappropriate. It is appropriate for the NRC to require that thermal models be appropriately justified for their application. It is likely that models used in licensing will be benchmarked against the high burnup demonstration program data. However, it is inappropriate for the NRC to require validation to the demonstration program in all cases. Other sources may be (and have been) used to provide a perfectly adequate validation.
8.	Technical Review Guidance Paragraph 2, Item 3 p. 3	The requirement that the interior of a helium-filled demonstration canister be monitored continuously for moisture, hydrogen oxygen, fission gas and fuel cladding axial temperature distribution is inappropriate. • Continuous monitoring is challenging from a technical perspective. Would this apply during transport from the pool to the pad? From the pad to an examination facility? • Continuous monitoring while on a storage pad provides a potential pathway for release of radioactivity to the environment. • Continuous monitoring is unnecessary. The storage system can be monitored for a period of time after loading and before being placed out on the pad—the time of greatest potential for damage—and monitored again at the end of the storage period. As a side comment, current plans are to carry out a high burnup demonstration program with a TN-32 bare fuel cask, not a canister-based system. The ISG incorrectly specifies a canister.
9.	Technical Review Guidance Paragraph 2, Item 4 p. 3	This requirement requires examination of the fuel "at periodic intervals," implying multiple openings and fuel examinations. No basis is provided for needing multiple openings, and such a requirement is inconsistent with the program conducted at Idaho with lower burnup fuel (only one of the six casks was opened, and only once). If multiple openings are a true requirement, the basis should be provided. That will assist in determining (i) the proper number of examinations and (ii) intervals between examinations that will satisfy the NRC.
10.	Technical Review Guidance Paragraph 2, Item 6 p. 3	No basis is provided for the minimum duration of 10 years. Also, is it permissible to open the cask one or more times during the 10 year period, as may be required under Item 4? Flexibility should be preserved here.

No.	Location	Comment
11.	Technical Review Guidance Paragraph 2, Item 6 p. 3	The last sentence in Item 6 is confusing and should be clarified. The current wording is: The evaluation of the data from the monitoring and examination of individual rods shall be available prior to the end of the currently approved storage period. What is the intended meaning and application of "currently approved storage period?" For a high burnup demonstration program with a storage duration of at least 10 years, this requirement may not be possible to meet in all cases.
12.	Technical Review Guidance Last Paragraph p. 4	This paragraph adds new requirements on aging management plans. It is not appropriate to levy such new requirements in an ISG.