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NUCLEAR REGULATORY COMMISSION  
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July 6, 2000

MEMORANDUM TO: Susan F. Shankman, Deputy Director  
Licensing and Inspection Directorate  
Spent Fuel Project Office, NMSS

FROM: Chester Poslusny, Jr., Senior Project Manager */RA/*  
Transportation and Storage Safety  
and Inspection Section  
Licensing and Inspection Directorate  
Spent Fuel Project Office, NMSS

SUBJECT: SUMMARY OF PUBLIC MEETING WITH THE NUCLEAR  
ENERGY INSTITUTE ON HIGH BURNUP FUEL

On April 27, 2000, a meeting was conducted at the U.S. Nuclear Regulatory Commission (NRC or Commission) headquarters in Rockville, Maryland. This meeting was publicly noticed on April 19, 2000. NRC representatives included staff from the Offices of Nuclear Reactor Regulation (NRR), Nuclear Material Safety and Safeguards (NMSS), and Research (RES). Private industry was represented by the Nuclear Energy Institute (NEI), the Electric Power Research Institute (EPRI), and other nuclear industry representatives. Attachment 1 is a list of attendees. The purpose of the meeting was to discuss the status of NRC's approval of increases in burnup limits for nuclear fuel in operating reactors and approaches for approving cask designs for the storage and transportation of high burnup fuel (fuel with burnups in excess of 45 GWd/MTU).

Ralph Beedle of NEI and William F. Kane of NRC/NMSS provided opening remarks. Mr. Beedle emphasized that the current burnup limit for storage, 45 GWd/MTU, will be exceeded for pressurized water reactors (PWRs) in 2001 and for boiling water reactors (BWRs) in 2003 - 2004; and at these points in time, the reactors will possess fuel that cannot be stored in the currently approved casks. Mr. Beedle stated that "sufficient attention must be turned to the long-term storage needs of the utilities that will be achieving higher burnups in the near term." Mr. Kane also expressed concern over the need to address high burnup fuel storage. He noted the importance of industry communicating to NRC its specific storage needs by providing detailed projections of the expected inventory and proposed design amendments. NRC requested that NEI collect the plant-specific burnup profiles and projections and provide the information to NRC.

Discussions were held on trends in reactor operations and fuel designs to meet current and future industry needs. A Duke Energy representative discussed projected burnup for existing and future fuel designs and confirmed that average burnups will approach the limit of 62 GWd/MTU, as approved by NRR for existing fuel designs (see Attachment 2). The representative noted that utilities are burning fuel longer and more efficiently with reduced costs. He also reiterated that utilities are generating fuel that cannot be stored in currently

approved casks, and this will become an economic and scheduling problem. Representatives of fuel vendors, ABB CE, Siemens, and Framatome discussed the key attributes for new fuel designs that will ensure desired cladding material characteristics throughout the life of the designs, even at higher duty and burnup levels above the current approved limit. Attachments 3, 4, and 5 reflect the information that was presented.

NRR staff discussed the Commission's perspective on burnup limits for operating plants. Specifically, as noted in Attachment 6, over the next 3 - 5 years, the Commission is expecting industry to develop a risk-informed program to support burnups as high as 75 GWd/MTU for PWRs and 70 GWd/MTU for BWRs. Approval will require reliance on data obtained from using the lead test assemblies and an effective fuel performance monitoring program implemented by industry. It was suggested that industry also collect data that could be used to support storage of the higher burnup fuel at the end of fuel life.

The NMSS Spent Fuel Project Office staff discussed the information needed to support approving cask designs for storing fuel with burnups in excess of the 45 GWd/MTU limit (see Attachment 7). The staff mentioned that it would be revising Interim Staff Guidance (ISG) 11, "Storage of Spent Fuel Having Burnups in Excess of 45,000 GWd/MTU." Key parameters considered for the acceptance criteria are cladding oxide thickness and a one-percent creep strain limit. Meeting these parameters could provide the basis for approving the storage of higher burnup fuels in casks. The staff noted that supplementary research work is being conducted, in collaboration with EPRI, to evaluate mechanical and creep properties of high burnup fuels. Also, NRC contractors are conducting a literature search to determine if additional data is available to support further modification and clarification of the staff's current position on high burnup fuel storage. The staff stressed that resources are limited and it needs to rely on additional data developed and obtained by industry to further develop the basis for storage approval.

EPRI staff discussed additional data that could support storing higher burnup fuels for extended periods of time with no safety concerns relative to the materials' properties of the fuel cladding and internals. This information is reflected in Attachment 8. It was also stated that some data was difficult to obtain because of its proprietary nature. NEI and EPRI agreed to provide additional data to better reflect the behavior of higher burnup fuel and cladding during long-term storage conditions. This information will be provided within 1 month from the date of the meeting.

Attachments 9 and 10 are slides provided by representatives of Holtec International and NAC International but were not discussed during the meeting.

No proprietary information was disseminated or presented at this meeting. No regulatory decisions were requested or made.

Please contact me if you wish to further discuss these issues.

- Attachments:
1. Attendance List
  2. Duke Power Slides
  3. ABB CE Slides
  4. Siemens Power Co. Slides
  5. Framatome Slides
  6. NRR Presentation on High Burnup Limits
  7. NMSS/SFPO Presentation on High Burnup
  8. EPRI Slides
  9. Holtec International Slides
  10. NAC International Slides

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**DISTRIBUTION: \*w/Attachments**

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<b>DATE:</b>	6/26/00		6/26/00		6/26/00		7/6/00					

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## NRC/NEI MEETING

April 27, 2000

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