



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

June 3, 2021

MEMORANDUM TO: Yoira Diaz Sanabria, Acting Deputy Director
Division of Fuel Management
Office of Nuclear Material Safety and Safeguards

FROM: Jonathan Marcano, Acting Branch Chief *Jonathan Marcano*
Nuclear Analysis and Risk Assessment Branch
Division of Fuel Management
Office of Nuclear Material Safety and Safeguards

SUBJECT: SUMMARY OF APRIL 13, 2021, OBSERVATION PUBLIC
WORKSHOP ON SPENT FUEL PERFORMANCE MARGINS

On April 13, 2021, the U.S. Nuclear Regulatory Commission (NRC) held an Observation public workshop with the Nuclear Energy Institute (NEI) and other industry representatives to continue dialogue on recommendations contained in the NEI's white paper on Spent Fuel Performance Margins dated November 8, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19318D971). This workshop built upon previous held workshops and focused on discussions pertaining to criticality recommendations, as well as discussions regarding the graded approach to streamline the format and content of storage certificates of compliance (CoCs), discussions on the next steps for the pilot of the risk tool and job aid for risk-informing technical reviews, and discussions on the status and next steps for the evaluation of thermal regulatory limits.

The presentation materials used by the NRC staff, industry, and Electric Power Research Institute (EPRI) during the subject workshop can be found in the Workshop Master Slides (ADAMS Accession No. ML21097A245). More than 50 individuals from industry, vendor groups, public citizens, and NRC staff attended the workshop (some participating in portions only) via Webex and telephone bridge line. The discussions held during this workshop benefited both the NRC staff and industry representatives, as they provided an effective and efficient forum of communication for all parties involved. No NRC staff decision was made during the meeting.

At the end of the workshop, the NRC staff provided an opportunity for the members of the public to comment or ask questions regarding NRC's regulatory process related to the topics discussed. No questions were raised during the public comment period of the meeting.

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Enclosure 1 contains the meeting agenda for the workshop as previously noted in the public meeting notice (ADAMS Accession No. ML21090A277). Enclosure 2 provides a list of those who participated. Enclosure 3 is the detailed summary table which was shared by the NRC staff during the workshop to documenting notes and a key message discussed during the workshop for each of the recommendations.

As documented in the detailed summary table in Enclosure 3, there has been significant progress and alignment made on the recommendations and their disposition into NRC longstanding regulatory processes. The staff considers the following recommendations completed, ready to be moved outside of the Spent Fuel Performance Margins efforts and to be tracked consistent with regulatory processes, such as, licensing reviews, updates to regulatory framework or other appropriate regulatory vehicles. The recommendations on criticality and on the evaluation of thermal regulatory limits remain as viable to stay under the Spent Fuel Performance Margins efforts to ensure continuous engagement activities occur to sustain progress and to reach resolution on a path forward. Therefore, the staff is closing the recommendations listed below.

- Recommendation II-1
- Recommendation III-1
- Recommendation III-2
- Recommendation III-3
- Recommendation V-1
- Recommendation V-2
- Recommendation VI-1
- Recommendation VI-2

The activities for the criticality recommendations and on the evaluation of thermal regulatory limits will continue under the framework of the Spent Fuel Performance Margins efforts to ensure continuous engagement activities occur to sustain progress and to reach resolution on a path forward. Below is the list of the recommendations associated to these topics. At this time the staff is not proposing additional public engagements until such efforts are more mature and primed for discussion

- Recommendation IV-1
- Recommendation IV-2
- Recommendation IV-3
- Recommendation IV-4
- Recommendation IV-5
- Recommendation VII-1
- Recommendation VII-2
- Recommendation VII-3

Additional details for each of the recommendations can be found in Enclosure 3 and in the NEI's white paper on Spent Fuel Performance Margins.

Enclosures:

1. Meeting Agenda
2. List of Participants
3. Meeting Summary Table: April 13, 2021, Workshop on Spent Fuel Performance Margins

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ON SPENT FUEL PERFORMANCE MARGINS

DATED: June 3, 2021

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DATE	06/03/2021	06/03/2021	06/03/2021

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MEETING AGENDA

OBSERVATION PUBLIC WORKSHOP ON SPENT FUEL PERFORMANCE MARGINS

April 13, 2021

<i>Time</i>	<i>Topic</i>	<i>Speaker</i>
1:00-1:10 PM	Introduction & Opening Remarks	NRC/NEI
1:10-2:10 PM	Criticality Recommendations	NRC/NEI
2:10-2:15 PM	Break	
2:15-3:45 PM	Status update of ongoing activities	NRC/NEI
3:45-4:00 PM	Summary of recommendations & Action Items	NRC
4:00-4:15 PM	Opportunity of Public Comments	
4:15-4:30 PM	Closing Remarks	

LIST OF PARTICIPANTS

OBSERVATION PUBLIC WORKSHOP ON SPENT FUEL PERFORMANCE MARGINS

APRIL 13, 2021

	NAME	AFFILIATION (as recorded)
	SPEAKERS	
1	Al Santos	EPRI
2	Alexis Sotomayor	NRC
3	Andrew Barto	NRC
4	Christian Jacobs	NRC
5	Denise Elisio	Holtec
6	Don Shaw	TN Americas
7	Glenn Schwartz	PSEG
8	Haile Lindsay	NRC
9	Hatice Akrurt	EPRI
10	John McKirgan	NRC
11	John Wise	NRC
12	Jonathan Marcano	NRC
13	Yaira Diaz	NRC
14	Keith Waldrop	EPRI
15	Mark Richter	NEI
16	Michael Hall	
17	Norma Garcia Santos	NRC
19	Ricardo Torres	NRC
20	Richard Chang	NRC
21	Robert Hall	
22	Stefan Anton	Holtec
23	Steve Baker	
24	Sven Bater	
25	Tom Boyce	NRC
26	Veronica Wilson	NRC
27	Yen Chen	NRC
28	Zita Martin	TVA
	PARTICIPANTS	
29	Andrea Kock	NRC
30	Andrea Jannetta	SNP Global Platts
31	Andrew Whitener	DVA
32	Benjamin Weiss	Reporter Exchange Monitor Publications
33	Brian Seawright	Holtec International
34	Brian Wagner	NRC
35	Carlyn Greene	UXC
36	Christopher Regan	US NRC

37	Den Vader	Orano
38	Don Shaw	TN Americas LLC
39	Emma Haywood	NRC
40	Gleen Schwarts	TSEG Nuclear
41	Jan Boudart	MEIS
42	Janella Jessie	NRC
43	John Kapitz	Exel Energy
44	Keith Waldrop	EPRI
45	Marlone Davis	NRC
46	Neil Sheeha	NRC
47	Omar Khan	NRC
48	Paul Plant	3 Yankees
49	Rick Migliore	TN Americas LLC
50	Robert Quinn	Westinghouse
51	Rod Mccullen	Nuclear Energy Institute
52	Tim Gregoire	Ragway Solution Magazine

MEETING SUMMARY TABLE

OBSERVATION PUBLIC WORKSHOP ON SPENT FUEL PERFORMANCE MARGINS

APRIL 13, 2021

Table Source: [Open Package \(NRC Response to NEI Letter Dated January 14, 2021, "Implementation of the Recommendations of Industry's November 8, 2019 White Paper"\)](#)

Table 3 - Actions to be addressed through NRC/Industry Dialogue

Rec. #	Summary	Results	Path Forward	NRC Staff Comments	Notes - April 13 Workshop/Updated Path Forward
IV-1	NRC and industry to conduct thermal modeling PIRT	COMPLETE • Thermal Modeling, Decay Heat Monitoring, and Fuel Performance PIRTs completed	Industry to apply the results of the PIRTs in future CoC applications and NRC to apply the results of the PIRTs in future licensing reviews.	The NRC agrees with the results. As for path forward, additional discussion may be warranted. We previously communicated in workshops, that a submittal for endorsement may be appropriate for broad applicability, consistency, and transparency (e.g., topical report, industry guidance, etc.)	Results met the intent of the recommendation. Alignment on path forward.
IV-4	Replace 400°C "cliff edge" metric for thermal modeling	SUBSTANTIAL ACTION TAKEN • As documented in the 5/13/20 and 6/1/20 letters referenced in Rec. IV-3 above, this will be accomplished by building on the combined results of the three completed PIRTs (IV-1 above) and the ongoing "gross rupture" PIRT (Rec. IV-5 below)	Industry and NRC to re-evaluate this limit after completion of the "gross rupture" PIRT.	The NRC agrees with the results and path forward. The NRC is currently participating in the EPRI led PIRT on gross rupture.	Pending on the results of the gross rupture and alternate fuel performance PIRTs.
IV-5	Develop graded approach to thermal modeling (reinterpret gross rupture)	SUBSTANTIAL ACTION TAKEN • NRC has agreed (6/1/20 letter) to engage in an ongoing PIRT to address this	Industry and NRC to engage on the development of this approach after completion of the	The NRC agrees with the results and path forward. The NRC is currently participating in the EPRI led PIRT on gross rupture.	Pending on the results of the gross rupture and alternate fuel performance PIRTs.

		recommendation. PIRT is ongoing.	“gross rupture” PIRT.		
V-1	Revise Sect. 6.4 of NUREG-1536 to allow representative vs. bounding dose rates and credit for design analysis	<p>SUBSTANTIAL ACTION TAKEN</p> <ul style="list-style-type: none"> The new review process NRC has developed per III-3 is specific to radiation dose/shielding and will enable this approach 	NRC to reflect new approach in NUREG.	The NRC agrees with the results and generally supports the path forward. In addition to the risk tool referenced, the NRC staff developed a method of evaluation approach to shielding analyses which would result in a more performance-based review and would facilitate the use of representative dose rates. NRC is evaluating how this approach can be applied to other technical areas and will incorporate this approach into NRC guidance.	Alignment on path forward.
V-2	Revise Chapter 6 of NUREG-2215 based on experience	<p>SUBSTANTIAL ACTION TAKEN</p> <ul style="list-style-type: none"> Industry completed NRC requested Operating Experience evaluation and presented results to NRC in 12/16 public meeting Risk tool being developed per II-1 will help enable 	NRC to revise Chapter 6 of the NUREG as appropriate to reflect lessons learned (including experience with application of the risk tool)	The NRC agrees with the results and the path forward. After review of the industry proposed topical report for the implementation of the Method of Evaluation (MOE) expected in FY 2021, NRC staff will begin planning for updates to NUREG-2215 (Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities).	NRC staff will revise NUREG-2215 as appropriate to reflect lessons learned from risk tool and shielding MOE.
VI-2	Align licensing approaches for fuel qualification information	<p>SUBSTANTIAL ACTION TAKEN</p> <ul style="list-style-type: none"> NRC approved graded approach to CoC amendments/applications per V-1 Holtec has committed to submit to NRC a “Shielding Method of Evaluation” topical report that will substantially improve the manner in which 	Holtec to submit and NRC to review, under the fee waiver granted for activities related to the White Paper.	The NRC agrees with results and path forward. The NRC will need to evaluate whether the current fee waiver extends to Holtec’s future topical report if a fee waiver is submitted.	Alignment on path forward. Fee waiver was not submitted for evaluation.

		fuel qualification information is addressed			
VII-1	Align licensing approaches for criticality safety	NO ACTION IN 2020 • Industry and NRC have agreed to planning dialogue to initiate needed actions	NRC and Industry to engage in further dialogue in 2021.	The NRC agrees with the result and path forward. NRC proposing a planning public workshop in the near- future.	NRC: 1. For fission product burnup, NRC is open to considering industry proposals. 2. For additional credit on neutron absorber capability, NRC is looking into potentially doing a research effort with the potential product of a NUREG/CR (outcome could be different). Timelines dependent of resources. NEI is looking for opportunities to build a proposal and share later this year (CY 2021) with further engagements in CY 2022 to discuss next steps.
VII-2	Develop more realistic modeling of fuel configuration	NO ACTION IN 2020 • Industry and NRC have agreed to planning dialogue to initiate needed actions	NRC and Industry to engage in further dialogue in 2021.	The NRC agrees with the result and path forward. NRC proposing a planning public workshop in the near- future.	EPRI noted this issue is not included in the current PIRT efforts but there seems to be alignment that the issue could be considered. * PIRT Results might help inform this recommendation, not something previously considered.
VII-3	Redefine “gross rupture”	NRC has agreed (6/1/20 letter) to engage in a PIRT that will begin in October and be complete by January 2021 to directly address this recommendation	NRC and Industry to develop new definition upon completion of the “gross rupture” PIRT.	While no characterization of the results was provided in NEI’s letter, the NRC believes, consistent with Rec. IV-4 and IV-5, that substantial action has been taken through EPRI’s gross rupture PIRT and agrees with the path forward. The current schedule is to complete this work in summer 2021.	Alignment that this will be covered with results from the gross rupture PIRT. *The most up to date schedule for this recommendation is included as part of EPRI slides.

Table 2 – Actions that can be taken by NRC within existing regulations

Rec. #	Summary	Results	Path Forward	NRC Staff Comments	Notes - April 13 Workshop
II-1	Graded Approach Review Process for CoC applications and amendments	COMPLETE SUBJECT TO CLARIFICATION: <ul style="list-style-type: none"> • NRC letter (1/24/20) defined licensing process expectations for more risk informed reviews • NRC developed a risk tool to enable a graded review process (12/17/20 workshop) 	After clarifying how regulatory transparency will be achieved in staff's use of this tool, NRC to implement this tool in its licensing reviews.	The NRC agrees with the results. As for path forward, the NRC developed a risk tool to enhance its safety focus during a CoC application review and will begin piloting this tool in February/March timeframe. The NRC is committed to transparency and has made the tool publicly available (ADAMS Accession Number ML20350B659). The NRC is also evaluating how best to engage with an applicant on the results of the risk tool and agrees this should be a topic for a near term future workshop.	Alignment on path forward. Additional Notes: The term 'graded approach' in the summary column refers to the risk tool for assigning levels of review. The NRC discussed the path forward for the use of the risk tool for acceptance reviews.
III-3	Less detailed reviews when conservatism is demonstrated	COMPLETE SUBJECT TO CLARIFICATION <ul style="list-style-type: none"> • The NRC licensing process implementations and risk tool (per Rec. # II-1) effectively addresses this recommendation as well 	After clarifying how regulatory transparency will be achieved in staff's use of this tool, NRC to implement this tool in its licensing reviews.	The NRC agrees with the results and as for path forward is evaluating how best to engage with an applicant on the results of the risk tool and agrees this should be a topic for a near term future workshop.	Results met the intent of the recommendation. Alignment on path forward (use of risk tool).
IV-3	NRC recognition of PIRT results in licensing reviews	SUBSTANTIAL ACTION TAKEN <ul style="list-style-type: none"> • Industry recommended (7/28/20 workshop) that this be addressed in NRC graded review process per II-1 above • Thermal Modeling, Decay Heat Monitoring, and Fuel Performance PIRTS have been completed and "gross rupture" PIRT is underway 	NRC to consider PIRTS as appropriate in its licensing reviews.	The NRC agrees with the results. As for path forward, additional discussion may be warranted on the use of PIRT reports. We previously communicated in workshops, that a submittal for endorsement may be appropriate for broad applicability, consistency, and transparency (e.g., topical report, industry guidance, etc.)	Revisit after completion of the gross rupture PIRT. Alignment on path forward.

Table 1 - Actions that can be taken by industry within existing regulations

Rec. #	Summary	Results	Path Forward	NRC Staff Comments	Notes - April 13 Workshop
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III-1	Utilize more realistic source terms	<p>COMPLETE</p> <ul style="list-style-type: none"> • NRC endorsement of NEI 12-04 (9/22/20) provides industry with improved flexibility • Action completed per Table 2 will provide additional flexibility 	Industry to build more realistic source terms into analyses as appropriate.	The NRC agrees with the results and path forward. In addition to the NRC's endorsement of NEI-12-04, the NRC staff developed a Method of Evaluation approach whereby a more performance-based review of shielding analyses would be completed, and more realistic source terms could be used by applicants as a representative source for the shielding calculations.	Results met the intent of the recommendation. Alignment on the path forward.
III-2	Do not apply uncertainty penalty on top of conservative source term	<p>COMPLETE</p> <ul style="list-style-type: none"> • NRC endorsement of NEI 12-04 (9/22/20) provides improved flexibility • Actions completed per Table 2 will provide additional flexibility 	Industry to reduce reliance on uncertainty penalties as appropriate.	This recommendation applies to the dry storage system users when selecting allowable fuel to be stored within a certified dry storage system. The NRC agrees with the results and path forward. The amount of certainty needed to establish that the burnup records are accurate is determined at the reactor site and is not regulated by the NRC. The NRC therefore does not require an additional level of margin associated with burnup within its reviews for compliance with 72.236(d).	No other actions. Industry currently using the 12-04 tool (endorsed by NRC).
IV-3	Develop and document industry consensus thermal modeling practices	<p>COMPLETE</p> <ul style="list-style-type: none"> • Thermal Modeling, Decay Heat Monitoring, and Fuel Performance PIRTS have been completed • Industry proposed new safety objective (5/13/20), NRC letter (6/1/20) agreed with approach, "gross rupture" PIRT process underway to define new safety objective that includes realistic and actionable fuel integrity metrics 	Industry to apply, in future license and Certificate of Compliance (CoC) applications, the insights documented in the PIRTS and letters.	The NRC agrees with the results. While we agree with the path forward, additional discussion may be warranted regarding how the results of the Phenomena Identification and Ranking Table (PIRT) reports could be utilized. We previously communicated in workshops, that a submittal for endorsement may be appropriate for broad applicability, consistency, and transparency (e.g., topical report, industry guidance, etc.)	Results of PIRTS can be used to inform this issue. No need for action at present time. Alternate Fuel Performance PIRT may inform this issue.

VI-1	Adopt and extend graded approach CoC precedent (Per Regulatory Issue Resolution Protocol I-16-01)	<p>COMPLETE</p> <ul style="list-style-type: none"> • NRC approved Orano pilot graded approach CoC (9/14/20) • NRC and industry aligned on future use of the graded approach (12/17/20 workshop) 	Industry to use the graded approach in future license and CoC applications.	The NRC agrees that significant progress has been made in completion of the graded approach pilot. The NRC staff is open to further discussion with the industry on how best to facilitate use of the graded approach. The staff also is looking to evaluate the lessons learned from the pilot, including working with the pilot's applicant, to assess if and what additional guidance may be necessary. The NRC staff's method of evaluation approach for shielding reviews is the first extension of the graded approach and the NRC staff is open to extending the graded approach concept to other technical areas.	Results met the intent of the recommendation. Industry providing feedback on how to use the worksheets (i.e. evaluation forms/template). Holtec shared insights from their experience using the graded approach. *For the graded approach on the contents of the CoC and its appendices (including technical specifications), the NRC previously received feedback on the templates but encourages the industry to provide any further feedback on the use of the templates.
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