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

March 11, 2024

MEMORANDUM TO: Gerond A. George, Chief
Licensing Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Daniel G. King, ATF Project Manager ***/RA/***
Licensing Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE FEBRUARY 26 TO 27, 2024, PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES RANKINGS PUBLIC MEETING

From February 26, 2024, to February 27, 2024, the U.S. Nuclear Regulatory Commission (NRC) staff and Information System Laboratories, Inc. (ISL) held a hybrid phenomenon identification and ranking table (PIRT) panel public meeting with representatives from the nuclear industry to discuss high burnup uranium dioxide fuel fragmentation, relocation, and dispersal (FFRD). The purpose of the meeting was to provide an opportunity for the PIRT panel to complete phenomena identification and ranking tables related to reactivity-initiated accident phenomena. This was a follow-up to the December 2023 (Agencywide Documents and Management System (ADAMS) Accession No. ML23352A274) and January 2024 (Accession No. ML24023A577) PIRT panel meetings. The meeting notice can be found in ADAMS under Accession No. ML24057A096.

Key observations from the meeting discussions:

- The PIRT panelists noted that fuel dispersal during a postulated reactivity-initiated accident (RIA) would be more limited than during a postulated loss-of-coolant accident.
- Fuel rod failure during a postulated RIA depends strongly on the core loading pattern. High burnup fuel is more susceptible to failure when placed near high-powered, lower-burnup assemblies. Existing methodologies can capture the core power distribution with a high degree of accuracy.

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- Transient fission gas release during an RIA both influences the likelihood of fuel rod failure and the potential magnitude of radionuclide release. While some transient fission gas release data exists, there is significant uncertainty in the results.
- Fuel fragment release to the reactor coolant system could potentially result in energetic fuel-coolant interactions. Note that existing NRC guidance includes limits to prevent catastrophic fuel rod failure that could challenge core coolability. However, these limits are meant to prevent release of molten fuel and do not explicitly consider the impact of solid fuel fragments. See Section C.6 of Regulatory Guide 1.236 (Accession No. ML20055F490).

The following schedule going forward was agree upon by NRC staff, ISL, and panelists.

February 28, 2024	Panel members provide their contributions to the conclusions section of the draft report.
February 29, 2024	ISL will send an updated draft of the report to the panelists for their review.
Mid-March, 2024	The panel meets to discuss their final comments on the draft report.
Late-March, 2024	ISL submits draft final report to NRC for publication. NRC will release the draft report publicly while it prepares the report for publication as a NUREG/CR.

There were four public comments received during the public comment period. First a member of the public asked the NRC staff about the logistics of the PIRT process and the connection to previous PIRT exercises. The NRC staff noted that previous Accident Tolerant Fuel PIRTs can be found at: https://www.nrc.gov/reactors/power/atf/pirt.html, noting this exercise focused on high burnup uranium dioxide FFRD. A member of the public then asked a series of questions related to the potential development of hydrogen during hypothetical accident scenarios. Next, a member of the public commented on the higher burnup connection to increased enrichment. Lastly, a member of the public asked several technical questions regarding the control rod drive mechanism for boiling water reactors. The PIRT panel provided additional information on the control rod drive mechanism (Accession No. ML12158A334). The NRC staff acknowledged all comments and questions from the public and will take them into consideration.

No regulatory decisions were made in the meeting.

Enclosures:
1. List of Attendees
2. Table of Contents for the Draft FFRD PIRT Report

List of Attendees

PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES RANKINGS PUBLIC MEETING
February 26 to 27, 2024

U.S. Nuclear Regulatory Commission (NRC)	
First Name	**Last Name**
Kristy	Bucholtz
Shawn	Campbell
James	Corson
Elijah	Dickson
Hossein	Esmaili
Daniel	King
Joseph	Messina
Carla	Roque-Cruz
Ashley	Smith
Chris	Van Wert

Non-NRC		
First Name	**Last Name**	**Organization (if provided)**
Don	Algama	U.S. Department of Energy
Kevin	Barber	Westinghouse Electric Company
Jana	Bergman	
Carl	Beyer	Pacific Northwest National Laboratory
Francis	Bolger	Electric Power Research Institute
Mary Beth	Brangan	
Nathan	Capps	Oak Ridge National Laboratory
Connie	Kline	
Dave	Kropaczek	Veracity Nuclear
Edwin	Lyman	Union of Concerned Scientists
Wade	Marcum	Oregon State University
Alred	Meyers	
Brian	Mount	Dominion Energy
Kurshad	Muftuoglu	EPRI
Vesselin	Palazov	Information System Laboratories, Inc. (ISL)
Harold	Scott	
Gretar	Tryggvason	Johns Hopkins University
Michael	Tudisco	Constellation Nuclear
Kalene	Walker	
Jason	Williams	ISL
	Wolfgang	

Note: Attendance list based on Microsoft Teams participant list. This list does not include individuals who did not provide their last name either in registering for the meeting or by a follow-up email.

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SUBJECT: SUMMARY OF THE FEBRUARY 26 TO 27, 2024, PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES RANKINGS PUBLIC MEETING DATED MARCH 11, 2024

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KBucholtz, NRR
SCampbell, RES
EDickson, NRR
MMahoney, NRR
CVanWert, NRR

ADAMS Accession No.:
ML24059A418 (Meeting Summary)

OFFICE	NRR/DORL/LLPB PM	RES/DSA/FSCB	NRR/DORL/LLPB LA	RES/DSA/FSCB BC
NAME	DKing	JCorson	DHarrison	HEsmaili
DATE	02/28/2024	02/29/2024	02/29/2024	03/11/2024

OFFICE	NRR/DORL/LLPB BC	NRR/DORL/LLPB PM
NAME	GGeorge	DKing
DATE	03/04/2024	03/11/2024

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