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

January 3, 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 DECEMBER 4 TO 7, 2023, PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES PUBLIC MEETING

From December 4, 2023, to December 7, 2023, 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. The purpose of the meeting was to provide an opportunity for the PIRT panel to ask questions of the NRC staff or make comments about issues related to the scope of the PIRT. The meeting notice can be found in the Agencywide Documents and Management System (ADAMS) under Accession No. ML23338A042.

Key observations from the meeting discussions:

- The PIRT panelists agreed that core coolability is the main concern associated with fuel dispersal during a postulated loss-of-coolant accident (LOCA).
    - The panelists stated that fuel dispersal is not likely to lead to recriticality during the postulated accident and that this could be verified utilizing existing computational methods and bounding assumptions.
    - The NRC staff noted that the impact of fuel dispersal on fission product releases during a LOCA has been evaluated, in Regulatory Guide 1.183, Revision 1, “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors” (ADAMS Accession No. ML23082A305).
- The impacts of fuel dispersal are highly dependent on total mass and size distribution of particles that could be released from fuel rods that burst during a LOCA. The particle size distribution is in turn influenced by a range of parameters, including the fuel burnup and the temperature reached during the postulated accident.

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- Spacer grids may influence fuel dispersal and its consequences. Spacer grids may reduce the mass that could be dispersed because they are expected to reduce cladding strain near grids. However, spacer grids may also influence the transport of fuel particles in the core.
- The knowledge level of phenomena related to the transport of fuel through the reactor coolant system is low. Bounding approaches may be useful to assess the potential consequences of fuel dispersal on core coolability, but more work is needed to develop and validate more realistic models.

The following schedule going forward was agree upon by the NRC staff, ISL, and panelists. Note that the panelists will be performing their own rankings individually with a consolidated table being constructed in January 2024. The second PIRT panel meeting will take place in January 2024, at which time the need for additional meetings will be assessed.

January 2024	Panel members complete ranking remaining phenomena, individually.
January 2024	Second panel meeting will be held, to discuss and consolidate rankings.
February 2024	ISL distribute draft report capturing outcomes to NRC staff and panelists for comment.
February 2024	ISL submits draft final report to NRC for publication.

No comments were received during the public comment portion of the meeting. Additional information on Accident Tolerant Fuel PIRTs can be found at:

https://www.nrc.gov/reactors/power/atf/pirt.html

No regulatory decisions were made in the meeting.

Enclosure: List of Attendees

List of Attendees

PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES PUBLIC MEETING
December 4 to 7, 2023

U.S. Nuclear Regulatory Commission (NRC)	
First Name	**Last Name**
Steve	Bajorek
Matthew	Bernard
Andrew	Bielen
Kristy	Bucholtz
Shawn	Campbell
Alice	Chung
James	Corson
Elijah	Dickson
Joseph	Donoghue
Richard	Fu
Kevin	Heller
Lois	James
Daniel	King
Scott	Krepel
Michael	Mahoney
Don	Marksberry
Sandra	McClure
Joseph	Messina
Donald	Palmrose
Mathew	Panicker
Carla	Roque-Cruz
Michael	Salay
Ashley	Smith
Joseph	Staudenmeier
Chris	Van Wert
Josh	Whitman
Zhe	Yuan

Non-NRC		
First Name	**Last Name**	**Organization (if provided)**
Birol	Aktas	TerraPower
Colleen	Armoruso	Information System Laboratories (ISL)
Kevin	Barber	Westinghouse Electric Company (Westinghouse)
Carl	Beyer	Pacific Northwest National Laboratory
Francis	Bolger	Electric Power Research Institute (EPRI)
Michael	Bradbury	ISL
Nathan	Capps	Oak Ridge National Laboratory
Thomas	Eichenberg	Tennessee Valley Authority
Jeffrey	Kobelak	Westinghouse
Dave	Kropaczek	Veracity Nuclear
Samuel	Lafountain	
Scott	Luchau	
Wade	Marcum	Oregon State University
Brian	Mount	Dominion Energy
Natalie	Morgan	
Kurshad	Muftuoglu	EPRI
Vesselin	Palazov	ISL
Baris	Sarikaya	Constellation Nuclear
Jay	Spore	Los Alamos National Laboratory
Nadejda	Todorova	Constellation Nuclear

Enclosure

Gretar	Tryggvason	Johns Hopkins University
Michael	Tudisco	Constellation Nuclear
W.	Wiesenack	Halden
Jason	Williams	ISL
Zefeng	Yu	Westinghouse

Note: Attendance list based on Microsoft Teams participant list and in person attendee sign in sheet. 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.

SUBJECT: SUMMARY OF THE DECEMBER 4, 2023, TO 7, 2023, PHENOMENON IDENTIFICATION AND RANKING TABLE PANEL DISCUSSION ON HIGH BURNUP FUEL DISPERSAL AND ITS CONSEQUENCES PUBLIC MEETING DATE: JANUARY 3, 2024

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DKing, NRR	SBajorek, RES	DMarksberry, RES

ADAMS Accession Nos.:
ML23352A274 (Meeting Summary)
ML23338A042 (Meeting Notice)

OFFICE	NRR/DORL/LLPB PM	RES/DSA/FSCB	NRR/DORL/LLPB LA	RES/DSA/FSCB BC
NAME	DKing	JCorson	DHarrison	HEsmaili
DATE	12/18/2023	12/19/2024	1/2/2024	1/3/2024

OFFICE	NRR/DORL/LLPB BC	NRR/DORL/LLPB PM
NAME	GGeorge	DKing
DATE	1/2/2024	1/3/2024

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