



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201-3367

AGENDA
Spring 2021 Board Meeting
May 12-13, 2021
Virtual Meeting

<https://preconvirtual.com/nwtrb-gov-spring-2021>

Wednesday, May 12, 2021

12:00 p.m. EDT

Call to Order and Introductory Statement

Jean Bahr, Board Chair

12:15 p.m. EDT

U.S. Department of Energy (DOE) Introduction to R&D Support for Accident Tolerant Fuels (ATFs); Characteristics of ATFs for Light Water Reactors

Bill McCaughey, DOE, Office of Nuclear Fuel Cycle and Supply Chain, NE-4;
Dan Wachs, Idaho National Laboratory

QUESTIONS TO BE ADDRESSED¹:

For DOE:

- What are the plans and goals of the DOE program to support development of new ATFs for light water reactors?
- What is the extent of DOE involvement in, and support of, the R&D related to commercial ATFs?

For Idaho National Laboratory:

- What are the key design characteristics of ATF candidates that set them apart from current light water reactor nuclear fuels? Please include ATFs with:
 - New cladding designs
 - Chromium or chromium nitride coated zirconium alloy
 - Iron-based cladding, including iron-chromium-aluminum
 - Silicon carbide composites
 - New fuel and new pellet designs
 - Chromia-doped or similar
 - High density fuel pellets, including uranium nitride
 - Fuels with higher enrichments of uranium-235 that are designed to operate at higher burnups
- For each of the main categories of ATFs, please explain the key characteristics of the fuel design that would have implications for spent nuclear fuel management.

¹ The questions have been provided to the speakers in advance of the meeting to convey the Board's primary interests in the agenda topics and to aid in focusing the presentations.

- What is the status of the lead test assemblies and post irradiation examinations for these ATFs? What are the key findings so far that would have implications for spent nuclear fuel management?
- What international collaborations inform DOE’s development work on ATFs?

1:10 p.m. EDT Questions, discussion

1:30 p.m. EDT **Characteristics of Lightbridge Fuel for Light Water Reactors**
Aaron Totemeier, Lightbridge

QUESTIONS TO BE ADDRESSED:

- What are the key design and performance characteristics of Lightbridge Fuel (fuel composition, cladding material, etc.) that set it apart from current nuclear fuels for light water reactors?
- What international collaborations inform this work?
- What R&D activities inform the spent nuclear fuel management of Lightbridge Fuel (such as spent nuclear fuel characterization, decay heat, long-term storage, transport, criticality, etc.)?

2:00 p.m. EDT Questions, discussion

2:20 p.m. EDT Break

2:40 p.m. EDT **U.S. Nuclear Regulatory Commission (NRC) Project Plan for ATF; Regulatory Perspectives on the Impact of ATF on Storage and Transport**
Marilyn Diaz and John Wise, NRC

QUESTIONS TO BE ADDRESSED:

- Please explain the scope and the focus of the NRC’s ATF “Project Plan.”
- What is the status of assessing the storage and transport implications of the near-term ATFs?—please describe plans for completing a Phenomena Identification and Ranking Table process for near-term ATFs.
- For the near-term ATFs with chrome-coated cladding and FeCrAl cladding, what are the remaining regulatory steps to complete before these fuels can be used in commercial nuclear reactors?
- For near-term and longer-term ATF concepts, when will the NRC staff consider the implications of these spent ATFs to disposal?

3:20 p.m. EDT Questions, discussion

3:40 p.m. EDT **DOE Perspectives on the Impact of Advanced Nuclear Fuels including ATFs on Spent Nuclear Fuel Storage, Transport, and Disposal**
William Boyle, DOE, Office of Spent Fuel and Waste Disposition, NE-8;
Sylvia Saltzstein, Sandia National Laboratories

QUESTIONS TO BE ADDRESSED:

For DOE:

- What is the DOE Office of Spent Fuel and Waste Disposition approach to accommodating new nuclear fuel designs including ATFs in DOE’s

Integrated Waste Management System (i.e., planning for possible long-term storage, transport, and disposal)?

- To what extent do the contractual agreements between DOE and the nuclear utilities regarding the acceptance of spent nuclear fuel by DOE allow DOE to influence the use of advanced nuclear fuel designs, including ATFs, by utilities?
- How are the R&D activities on ATF development integrated with R&D activities related to spent nuclear fuel management (such as characterization, managing decay heat, long-term storage, transport, criticality, etc.)?

For Sandia National Laboratories:

- Please describe the key finding in the recently published report “High Level Gap Analysis for Accident Tolerant and Advanced Fuels for Storage and Transportation.” What follow up analyses are planned to fulfill the data needs?
- What are the key characteristics (cladding mechanical strength/ductility, thermal behavior, chemical stability, etc.) of spent ATF that are most important to consider for long-term storage and transport?
- What are the DOE/Sandia’s plans to assess the impacts of new nuclear fuels including ATFs on spent nuclear fuel disposal?

4:20 p.m. EDT Questions, discussion

4:40 p.m. EDT Public Comments

5:00 p.m. EDT Adjourn

Thursday, May 13, 2021

12:00 p.m. EDT **Call to Order**
Jean Bahr, Board Chair

12:05 p.m. EDT **Plans for Advanced Nuclear Fuels including ATFs in Switzerland and Policies and Procedures for Managing the Resulting Spent Nuclear Fuel**
Stefano Caruso, KKG

QUESTIONS TO BE ADDRESSED:

- What advanced nuclear fuels including ATFs for light water reactors are being considered in Switzerland and what attributes of these fuels are important for spent nuclear fuel management?
- How much of the R&D is done collaboratively with other countries?
- What is the Swiss process for approving new nuclear fuel types? When assessing new fuels, how do the utilities (e.g., KKG) and the fuel vendors consider plans for storage, transport, and disposal of the resulting spent nuclear fuels?
- What roles do the regulator and the implementer of the Swiss nuclear waste management program have when considering storage and disposal issues for ATF and other advanced fuels?

12:35 p.m. EDT Questions, discussion

12:55 p.m. EDT Plans for Advanced Nuclear Fuels including ATFs in Sweden and Policies and Procedures for Managing the Resulting Spent Nuclear Fuel
Anders Sjöland, SKB

QUESTIONS TO BE ADDRESSED:

- What advanced nuclear fuels including ATFs for light water reactors are being considered in Sweden and what attributes of these fuels are important for spent nuclear fuel management?
- How much of the R&D is done collaboratively with other countries?
- What is the Swedish process for approving new nuclear fuel types? What part of the process considers plans for storage, transport, and disposal of the resulting spent nuclear fuels?
- What kinds of activities would help a nuclear utility demonstrate acceptability of new reactor fuel types for spent nuclear fuel storage, transport, and disposal?

1:25 p.m. EDT Questions, discussion

1:45 p.m. EDT Break

2:05 p.m. EDT Plans for Advanced Nuclear Fuels including ATFs in the UK and Policies and Procedures for Managing the Resulting Spent Nuclear Fuel
Dave Goddard and David Hambley, National Nuclear Laboratory (NNL)

QUESTIONS TO BE ADDRESSED:

- What advanced nuclear fuels including ATFs for light water reactors are being considered in the UK and what attributes of these fuels are important for spent nuclear fuel management?
- How much of the R&D is done collaboratively with other countries?
- What is the UK process for approving new nuclear fuel types? What part of the process considers plans for storage, transport, and disposal of the resulting spent nuclear fuels?
- What has been learned from testing uranium-silicide and uranium-nitride fuels that can inform the development and potential use of these and other advanced nuclear fuels?

2:35 p.m. EDT Questions, discussion

2:55 p.m. EDT Panel: Potential Impacts of Advanced Nuclear Fuels including ATFs on Spent Nuclear Fuel Storage, Transport, and Disposal

Dan Wachs, Idaho National Laboratory
Aaron Totemeier, Lightbridge
John Wise, NRC
Sylvia Saltzstein, Sandia National Laboratories
Stefano Caruso, KKG (Switzerland)
Anders Sjöland, SKB (Sweden)
David Hambley, NNL (UK)

QUESTIONS TO BE ADDRESSED:

- What are the main implications of new fuel designs for spent nuclear fuel management (storage, transport, and disposal)?
- For countries interested in ATF or other advanced fuel designs for their light water reactors, what kinds of R&D activities would help them understand the implications of such a change?
- What opportunities do you see for international collaboration in planning for spent nuclear fuel management of ATFs and advanced nuclear fuels?
- What kind of changes in the regulations related to spent nuclear fuel management need to be implemented to support the use of advanced nuclear fuels, including ATFs?

4:10 p.m. EDT Public Comments

4:30 p.m. EDT Adjourn