

Accident Tolerant Fuel Overview

EPRI-DOE ATF WS

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We make SAFE use of nuclear technology POSSIBLE.



Near-Term ATF Technologies



Coated Cladding

- A thin chromium-based layer is applied to the cladding outer diameter
- NRR staff have issued Interim Staff Guidance ATF-ISG-2020-01 to support reviews
- Currently awaiting topical reports

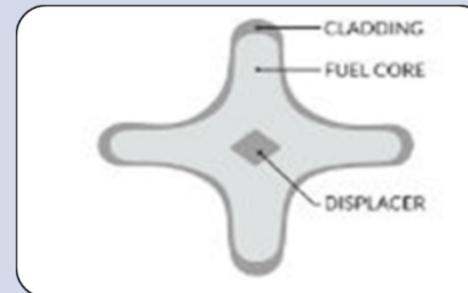
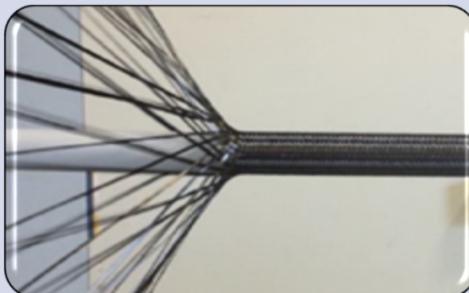
Doped Pellets

- UO_2 pellets contain small amounts of added materials that improve performance through larger grain sizes
- Already approved for BWRs. Two fuel vendors have submitted TRs for PWRs.
- No foreseen licensing challenges

FeCrAl Cladding

- Iron-Chromium-Aluminum based alloy fuel cladding.
- Commercialization is a few years away

Longer Term ATF Technologies



High Density (Uranium Nitride) Pellets

- Fuel made of Uranium Nitride instead of Uranium Dioxide

Silicon Carbide Cladding

- Ceramic composite-woven fibers around a monolithic tube

Extruded Metallic Fuel

- Extruded metallic bar composed of a Zirconium-Uranium matrix within a zirconium alloy cladding

Increased Enrichment and Higher Burnup

Higher Burnup

- Current limit ~ 62 gigawatt days per (GWd/MTU) rod-average burnup – Not a regulatory limit
- Industry goal to reach 75 to 80 GWd/MTU

Increased Enrichment

- Enrichment currently limited to 5 weight percent ^{235}U .
- Industry goal up to 10 weight percent ^{235}U

NRC ATF Project Plan

Industry

NRC

Development of technical bases

Licensing activities

Data and technical information sharing

**Frequent
communication and
engagement throughout**

Phenomena identification and ranking exercise

Potential changes to regulatory infrastructure

Code development

Staff education

Licensing review

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Recent NRC Actions

SECY-21-0109: “Rulemaking Plan on Use of Increased Enrichment of Conventional and Accident Tolerant Fuel Designs for Light-Water Reactors”

ATF Project Plan, Version 1.2

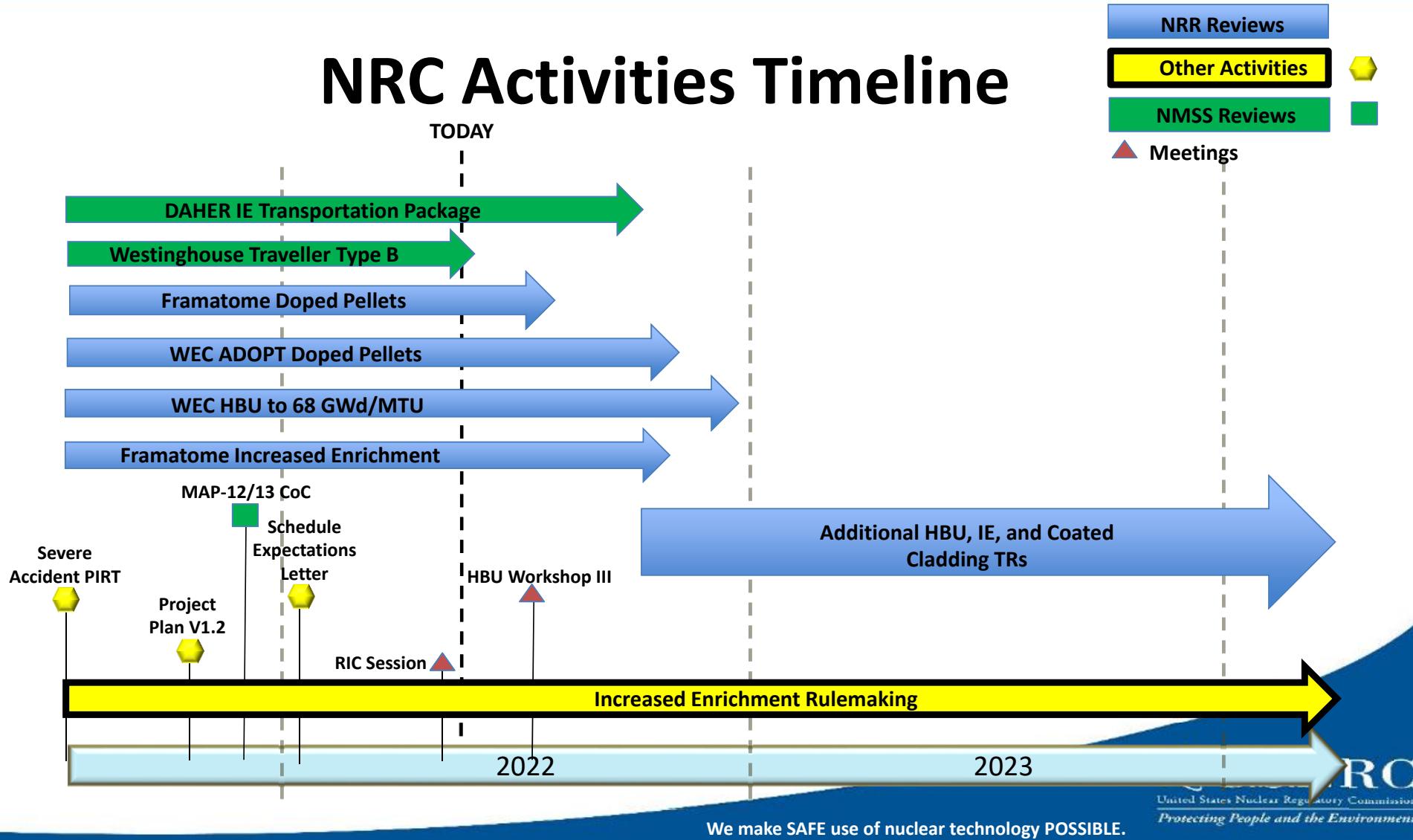
Research Information Letter 2021-13, “Interpretation of Research on Fuel Fragmentation, Relocation, and Dispersal at High Burnup”

Communication to industry: “Scheduling Expectations Regarding the Licensing of Accident Tolerant, Increased Enrichment, and Higher Burnup Fuels”

Numerous workshops and stakeholder engagement throughout last year

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NRC Activities Timeline



ATF Website

- www.nrc.gov/reactors/atf.html
- Routine updates to lists of ATF-related:
 - Licensing actions
 - Documents
 - Public meetings



The screenshot shows the homepage of the ATF website. The header features a blue banner with the text "Accident Tolerant Fuel Regulatory Activities" and a background image of a nuclear reactor's interior. Below the banner are four navigation links: "Stay Connected ▾", "FAQs", "Additional Topics ▾", and "References ▾". A large blue button in the center says "What is Accident Tolerant Fuel?". Below this button is a paragraph of text. To the right of the text are two sections: "Why the Interest Now?" and "What is the NRC's Role?". Each section has a blue button with a play icon and the word "Origins" next to it. At the bottom of the page is a section titled "Accident Tolerant Fuel Technologies" with three images: a conveyor belt with metal rods, a pile of green cylindrical rods, and a barcode.

We make **SAFE** use of nuclear technology **POSSIBLE**.

**If you have additional questions or
comments, please contact:**

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