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AGR Program Annual Review: Concluding Remarks

July 2024

Paul A Demkowicz

Changing the World's Energy Future

Idaho National Laboratory

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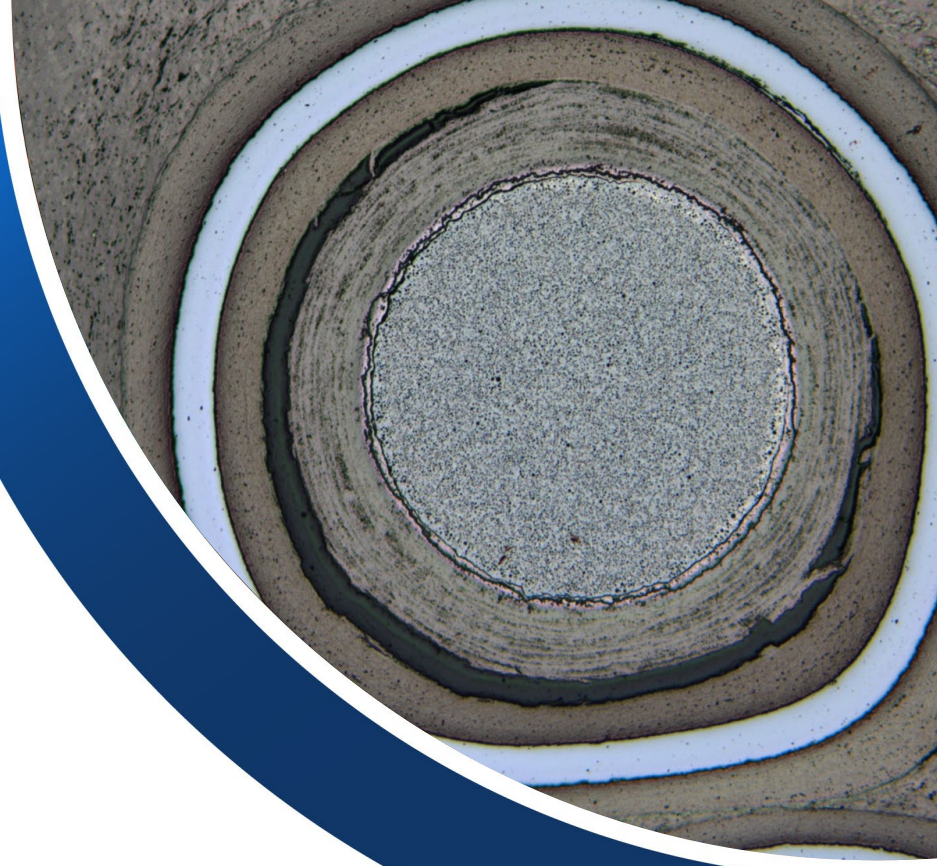
GAS-COOLED REACTOR
ADVANCED REACTOR TECHNOLOGIES PROGRAM



July 16, 2024

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AGR Program Technical Director

DOE ART GCR Review Meeting

Hybrid Meeting at INL

July 16–18, 2024

Major AGR Program Activities – FY24 and Beyond

- **Complete AGR-3/4 data analysis and reporting**
  - Determine key takeaways in terms of fission product transport
- **Continue/complete AGR-5/6/7 PIE and safety testing**
  - Confirm performance of pilot-scale fuel, including performance at extreme high and low temperature regimes
- **Oxidation tests**
  - Determine fuel and fission product behavior under oxidizing conditions
- **Reporting**
- **Compile AGR datasets for use by reactor designers, e.g.:**
  - Fission product retention characteristics of the fuel (*separate presentation today*)
  - Fuel failure analyses under all tested conditions
  - Oxidation behavior and impact on fission product retention
- **Fuel performance and fission product transport modeling**
- **Support industry interaction with the regulator during licensing activities**

DOE Organizational Changes Impacting AGR Program and Future Coated Particle Fuel Development

- Coated particle fuel activities are moving from NE-52 (Office of Advanced Reactors) to NE-42 (Office of Advanced Fuel Technologies)
- AGR Program separated from Advanced Reactor Technologies – Gas Cooled Reactor campaign and part of Advanced Fuels Campaign
- AGR Program Scope remains; transition to next-generation coated particle fuel development as AGR scope is completed

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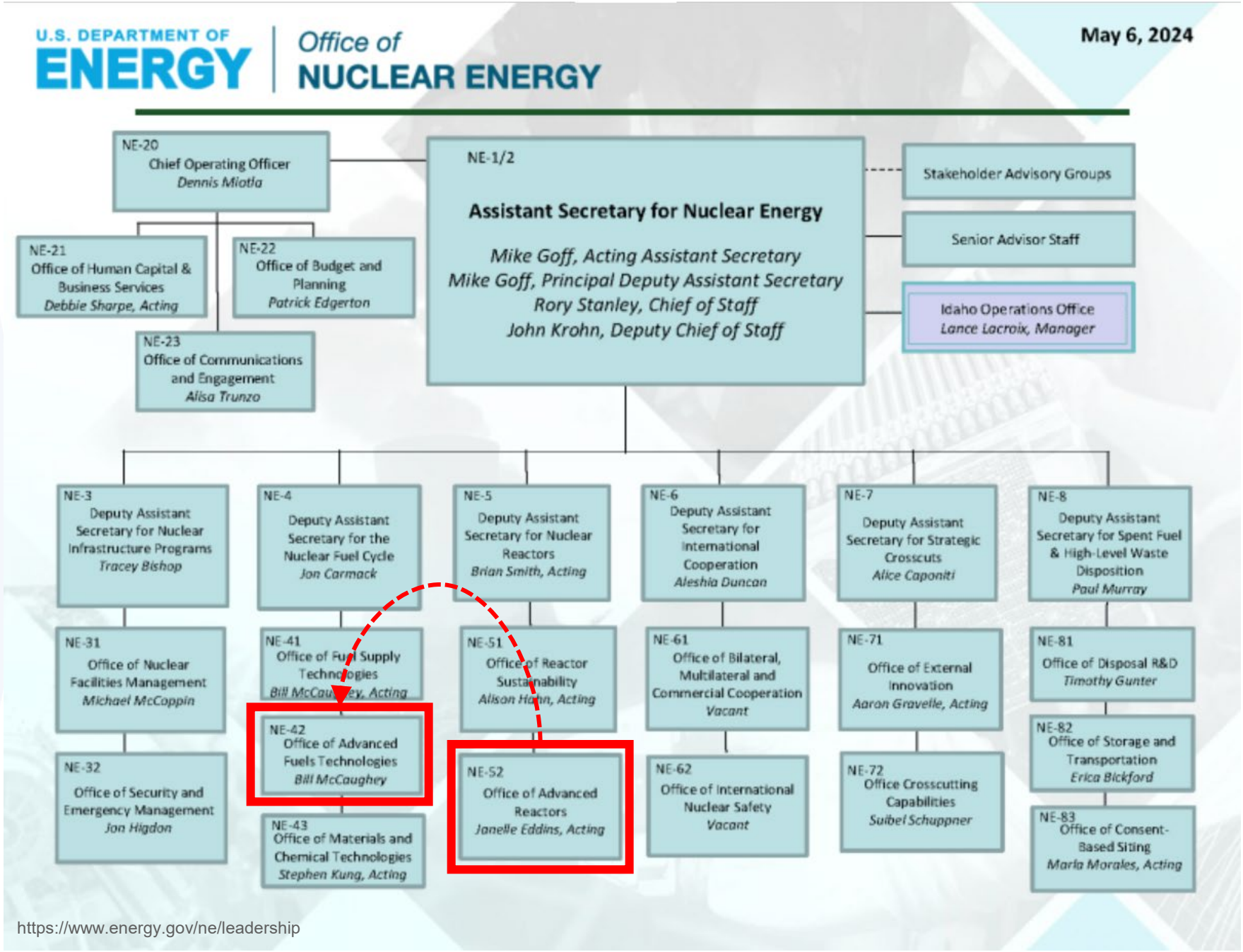
May 6, 2024



https://www.energy.gov/ne/leadership

Next Generation Fuel

Advanced Fuels Campaign

→

Next Generation Fuels

- Metallic Fuel
- Coated Particle Fuel
- Long-term Accident Tolerant Fuel
- Molten Salt Fuel (?)

(Enable advanced reactors)

ATF

Near-term Accident Tolerant Fuel

(Sustain LWR fleet)

- NGF:
  - Develop long-term fuel technology
  - Establish fuel qualification basis for advanced designs
  - Explore accelerated fuel qualification strategies

Coated Particle Fuel Beyond AGR Fuel Qualification

Advanced coated particle R&D

- Expand/maintain facility capabilities and staff expertise
  - Support of DOE and industry irradiation testing and PIE for advanced coated particle fuels
- Novel, high-performance coated particle fuel concept development
  - Promising “High-TRL” particle designs
  - Advanced particle designs (alternate coatings, burnable absorbers, etc.)
- Irradiation testing
  - New fuel concepts
  - Explore long-core-life phenomena (e.g., Pd attack)
  - Explore accelerated testing
- Fuel fabrication and QC method improvement
  - Process improvements
  - Fuel property improvements and fuel specification refinement
  - Improved fuel characterization (i.e., QC) methods
- Fuel performance modeling improvements
- Separate effects testing for coated particle fuel material properties in support of fuel performance modeling

- **Increase safety margins**
- **Expand fuel performance envelope**
- **Improve model fidelity**

AFC/NGNF Annual Meeting

- Technical review meeting to be held in-person December 3-5 at UC Berkeley
- Will include presentations from TRISO qualification team
- Agenda TBD; updates to come

GAS-COOLED REACTOR

ADVANCED REACTOR TECHNOLOGIES PROGRAM

Thank you for your attention

Paul Demkowicz

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