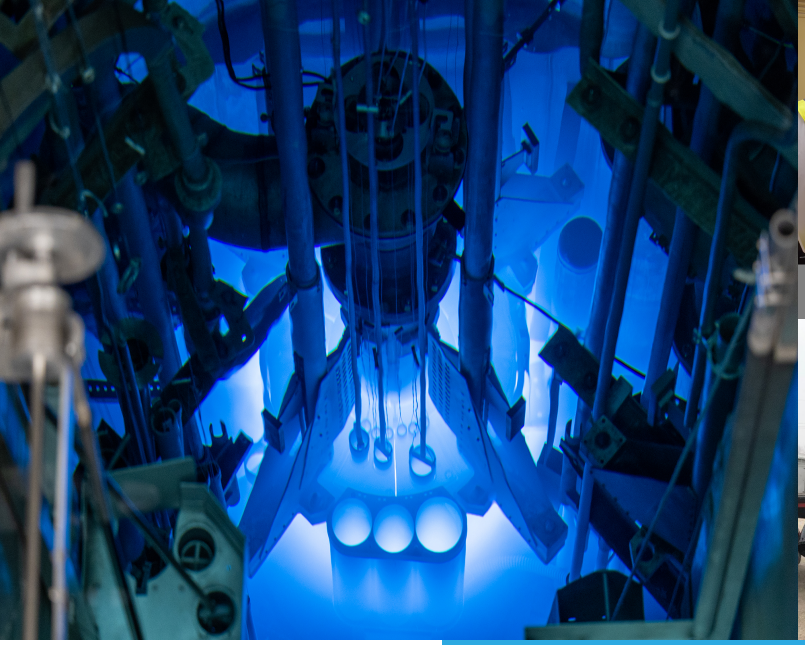


September 30, 2024

**Douglas Morrell**
UFS Project Manager

# 2024 Status Report

## DOE University Fuel Services Program

Battelle Energy Alliance manages INL for the
U.S. Department of Energy's Office of Nuclear Energy

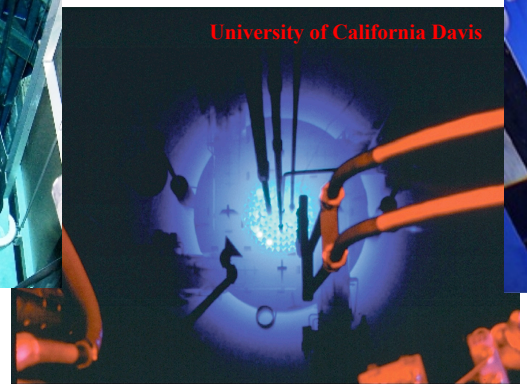
Idaho National Laboratory

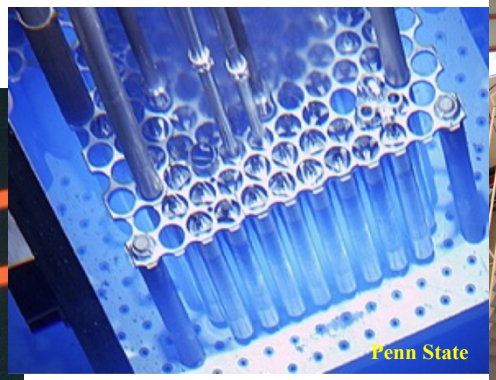
# Topics for Discussion

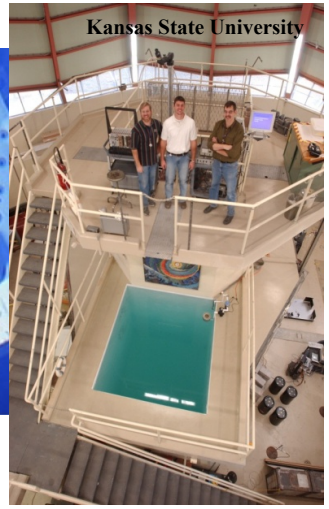
- Overview of the University Fuel Services Program
- Accomplishments During the Past Year
- TRIGA Fuel Fabrication
- 2025 Forecast
- Future Challenges

# Purpose of the UFS Program

**The purpose of the United States Domestic University Fuel Services Program is to provide fresh nuclear reactor fuel to United States universities at no, or low, cost to the university. The title of the fuel remains with the United States government and when universities are finished with the fuel, the fuel is returned to the United States government.**

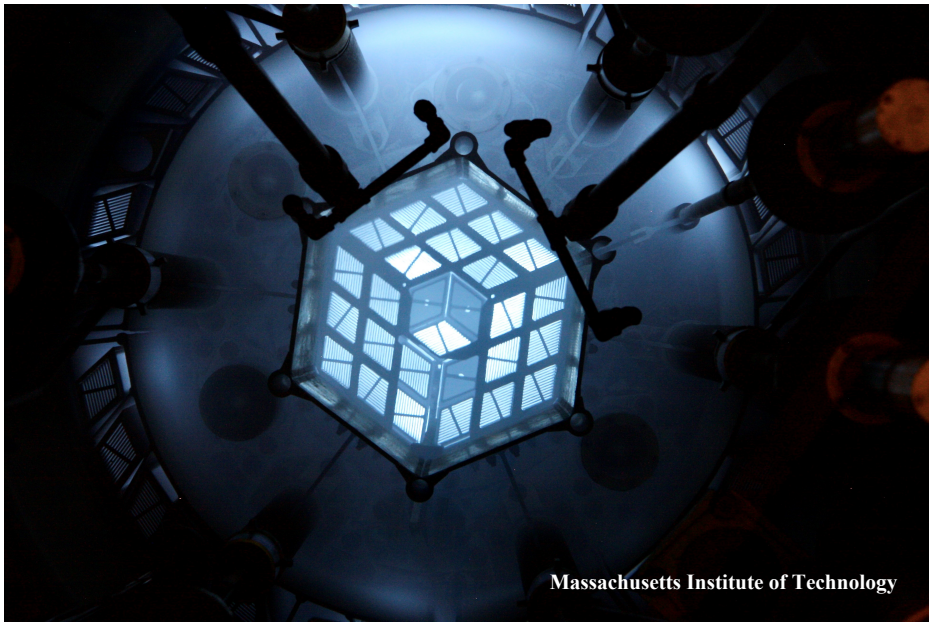



# UFS does NOT…

- Develop new fuel types for NRC review and approval
- Provide HALEU or enriched uranium directly to universities
- Provide reactor operation equipment or other ancillary components related to fuel fabrication or assembly.

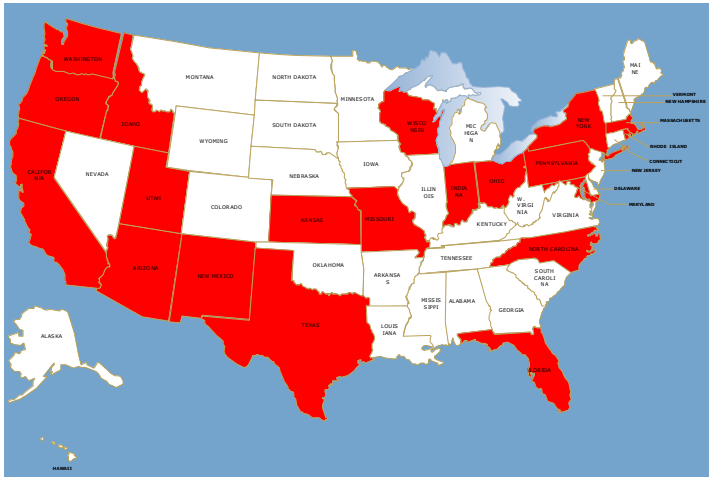


# Program Management

| | |
|---|---|
| **DOE-HQ** | **Andrew Boulanger** |
| **DOE-ID** | **Nathan McBride** |
| **Idaho National Laboratory** | |
| Project Manager | Doug Morrell |
| Quality Engineer – in Idaho | Melanie Sokoine |
| Quality Engineer – in Virginia | Tom Chambers |

# The University Fuel Services Program

- Funded by the U.S. Department of Energy
- Managed by DOE-HQ and DOE-ID Operations Office
- Contracted to the INL's Management and Operations Contractor – Battelle Energy Alliance
- Program has been in Idaho since 1977
  - INL subcontracts with 24 U.S. universities to supply fresh nuclear reactor fuel for operations
    - Twelve TRIGA facilities
    - Eight plate fuel facilities
    - Three AGN facilities
    - One Pulstar fuel facility
    - One Critical facility



# University TRIGA Reactor Facilities

- Kansas State University
- Oregon State University
- Penn State University
- Reed College
- Texas A&M
- University of California Davis
- University of California in Irvine
- University of Maryland
- University of Texas in Austin
- University of Utah
- University of Wisconsin
- Washington State University

# University Plate Fuel Reactor Facilities

- Massachusetts Institute of Technology
- Missouri University of S&T - Rolla
- Ohio State University
- Purdue University
- Rhode Island Nuclear Science Center
- University of Florida
- University of Massachusetts – Lowell
- University of Missouri – Columbia

# Other University Reactor Facilities






- AGN Reactors
  - Idaho State University
  - Texas A&M
  - University of New Mexico
- Pulstar Reactor
  - North Carolina State University
- Critical Facility
  - Rensselaer Polytechnic Institute

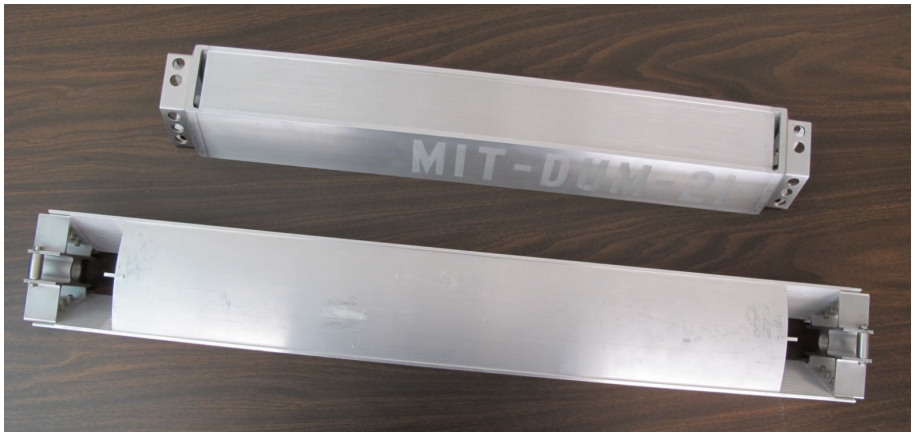
# Reactor Power Levels

| Facility | Power |
|---|---|
| University of Missouri – Columbia | 10 MW |
| Massachusetts Institute of Technology | 6 MW |
| University of California – Davis | 2 MW |
| Rhode Island Nuclear Science Center | 2 MW |
| Kansas State University | 1.25 MW |
| Oregon State University | 1 MW |
| University of Texas, Austin | 1 MW |
| North Carolina State University | 1 MW |
| Pennsylvania State University | 1 MW |
| Texas A&M University | 1 MW & 5W |
| University of Massachusetts – Lowell | 1 MW |
| University of Wisconsin | 1 MW |

| Facility | Power |
|---|---|
| Washington State University | 1 MW |
| Ohio State University | 500 kW |
| Reed College | 250kW |
| University of California – Irvine | 250 kW |
| University of Maryland | 250 kW |
| Missouri University of S&T | 200kW |
| University of Florida | 100 kW |
| University of Utah | 100 kW |
| Purdue University | 10 kW |
| Idaho State University | 5 W |
| University of New Mexico | 5 W |
| Rensselaer Polytechnic Institute | 1 W |

# 2024 Accomplishments

- Provided fuel to MURR and MIT allowing them to maintain operations at current power levels
- Completed the shipment of 30 TRIGA fuel elements to Penn State University
- North Carolina State University performed engineering studies for the replacement of the PULSTAR fuel core (3-year project)



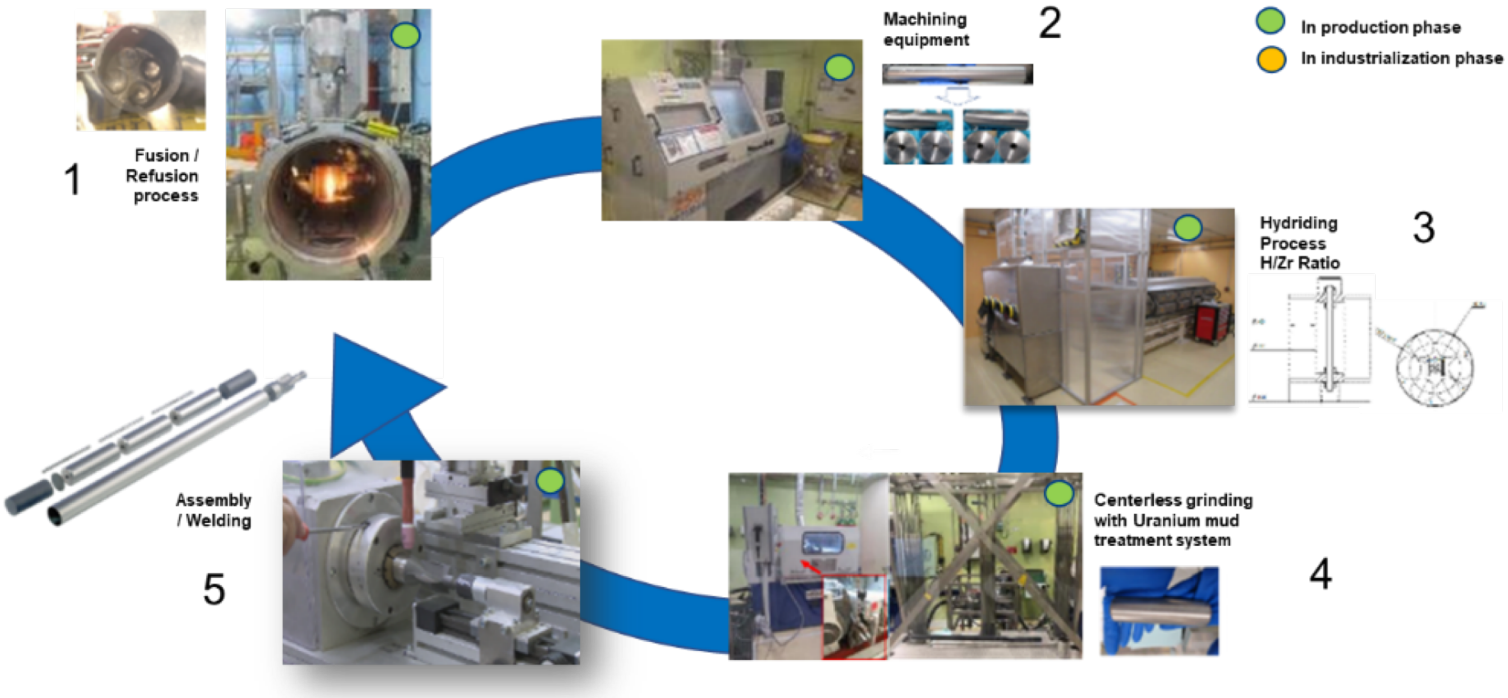
# 2024 Accomplishments

- Three shipments of spent nuclear fuel from MURR to Savannah River Site receipt facility
- One shipment of spent nuclear fuel from MIT to Savannah River Site receipt facility

DOE Owned BRR Cask

# TRIGA Fuel Fabrication Status

- The TRIGA fuel fabrication line is in full production mode.
- As of September 1, 2024, eighty-nine TRIGA fuel elements have been fabricated, of which eighty-seven have been inspected and certified.



# TRIGA Fuel Fabrication Status

- TRIGA fuel types that have been fabricated:
- 8.5 wt% Standard Elements
- 12 wt% Standard Elements
- 8.5 wt% Instrumented Elements
- 12 wt% Instrumented Elements
- 8.5 wt% Standard Cluster Elements (Conversion)
- 30 wt% Standard Cluster Elements (Conversion)
- Additional TRIGA fuel types that are under contract to be fabricated:
- 30 wt % Standard Elements
- 30 wt% Instrumented Cluster Elements (Conversion)

TRIGA Standard Fuel Element

TRIGA 4 Element Fuel Cluster
(MTR Conversion)

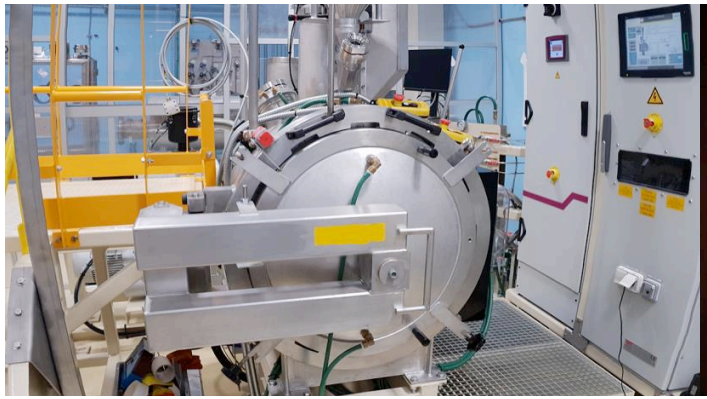
# TRIGA Fuel Fabrication Status

- Two TRIGA fuel fabrication contracts have been awarded for a total of 144 elements. Third TRIGA fabrication contract is being negotiated for an additional 89 fuel elements.
- First shipment of fuel to Penn State was completed in September 2023.
- The CPP-651 fuel storage facility located at the Idaho National Laboratory will receive its first shipment of 45 TRIGA elements in November 2024.
- Storage of New Fuel at Reactor Facilities
  - Amendment Requests for Increased Possession Limits
  - Physical Storage Space

TRIGA fuel elements at Penn State

# 2025 Forecast

- Provide fuel to MURR and MIT to maintain current operating power levels
- Continue fabrication of TRIGA fuel elements
- Complete three spent fuel shipments from MURR
- Complete one spent fuel shipment from MIT
- Prepare the Irradiated Fuel Storage Facility (IFSF) located at the Idaho National Laboratory to receive and store irradiated TRIGA elements.



# Requests for Assistance

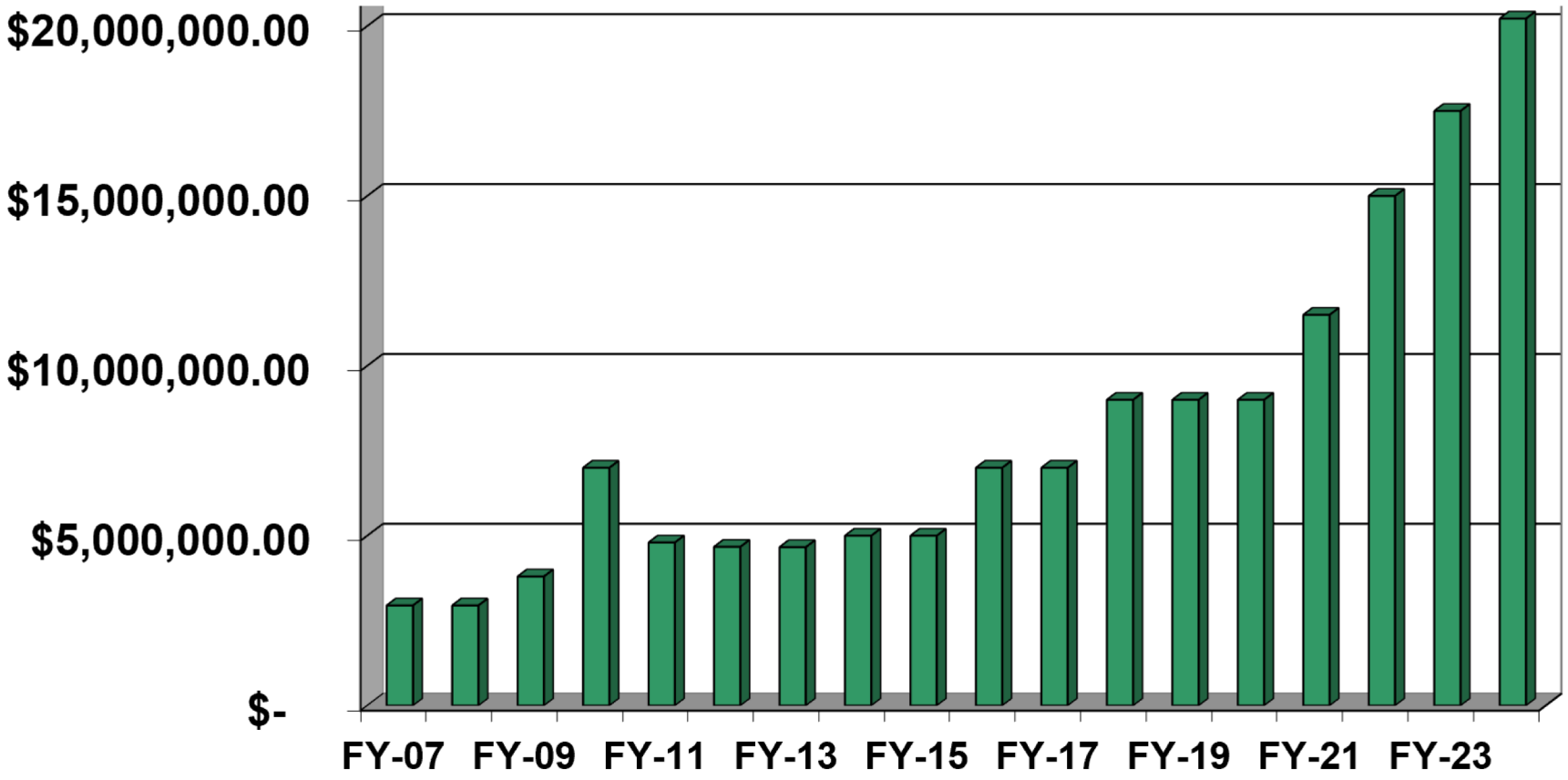
- UFS Program will be requesting data for the Annual Report for the Department of Energy.
- UFS Program will be sending out request to TRIGA facilities for update on forecasted fresh fuel needs.

- Future requests for fresh fuel or spent fuel shipments need to be communicated to program office at a minimum of two years in advance (Preferably Longer) – Provide documentation to justify request (E-mail or official letter notification preferred)
- Doug Morrell (208) 201-6595

# Future Challenges

- Receipt of irradiated TRIGA fuel at the IFSF located at the Idaho National Laboratory
- Conversion of MURR and MIT from HEU to LEU fuel type
  - MURR & MIT conversion tentatively set for 2032

# Funding Profile



# UFS Team Members
























IDAHO NATIONAL LABORATORY

75TH ANNIVERSARY

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*Battelle Energy Alliance manages INL for the U.S. Department of Energy's Office of Nuclear Energy. INL is the nation's center for nuclear energy research and development, and also performs research in each of DOE's strategic goal areas: energy, national security, science and the environment.*

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