U.S. DEPARTMENT OF ENERGY | Idaho Operations Office

Overview of the Idaho Operations Office

Robert Boston
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U.S. Department of Energy
Idaho Operations Office

Idaho National Laboratory
Infrastructure portfolio – By the numbers

Infrastructure portfolio – By the numbers

298 DOE Owned Buildings & Trailers

27 Contractor Leased Buildings & Trailers

25 Nuclear Facilities
Haz Cat I Adv. Test Reactor
Haz Cat II
Haz Cat III

44 Radiological Facilities

4 Operating Reactors

4,409 Staff & Subcontractors

3.2B	$	RPV
3.3M	SQ FT	Gross

3 Fire Stations
1 Landfill
1 Museum

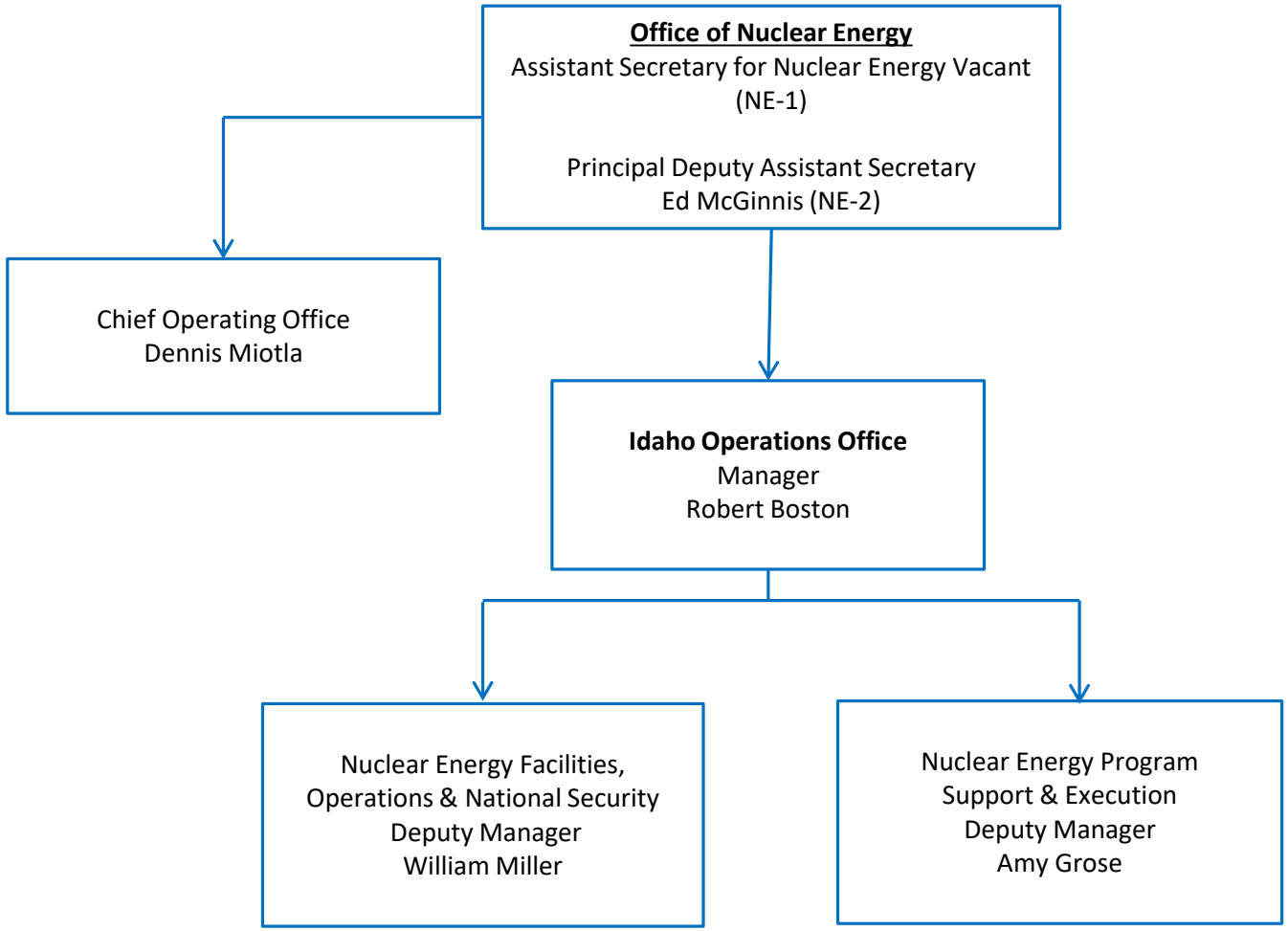
40 Miles primary roads / 125 total

17.5 Miles railroad for shipping nuclear fuel

7 Substations with interfaces to 3 power providers

112 Miles high-voltage transmission lines

NE-ID Organization Chart



Idaho Operations Office
Organizational Responsibilities

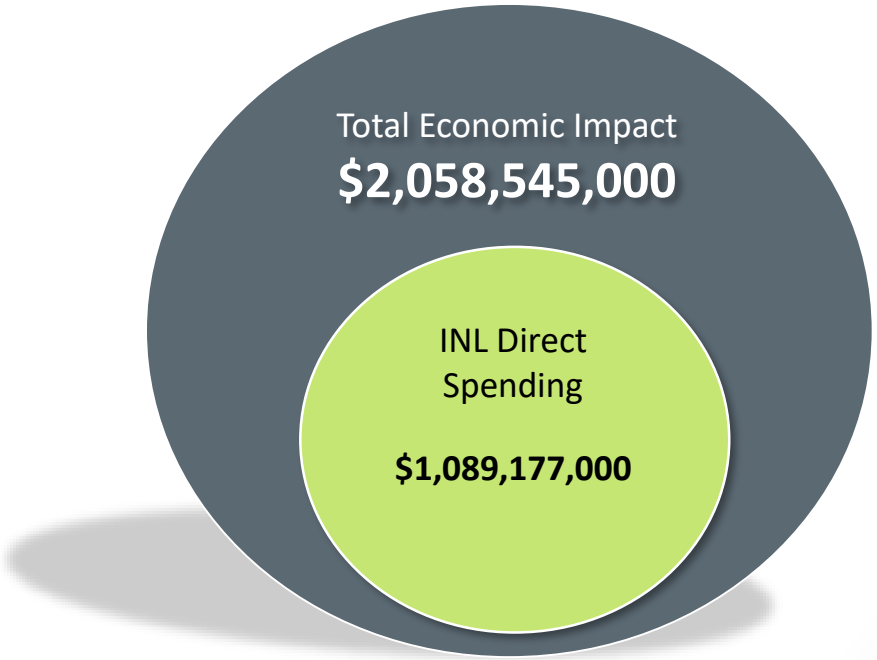
- Procurement Management
- Operational Oversight / Contractor Assurance
- Headquarters Support
- Security of Nuclear Material and Information Security Systems
- Site Stewardship
- Project Management

M&O Contractor Performance

- DOE tailors its oversight based on the INL's use of and results from internal systems and oversight (e.g. Contractor Assurance)
- DOE defines performance expectations annually in a Performance Evaluation and Measurement Plan
  - focused toward strategic objectives and
  - allows the contractor to determine the best way to achieve objectives
- DOE manages the Battelle Energy Alliance, LLC (BEA) contract, BEA runs the Lab

INL FY18 Economic Summary

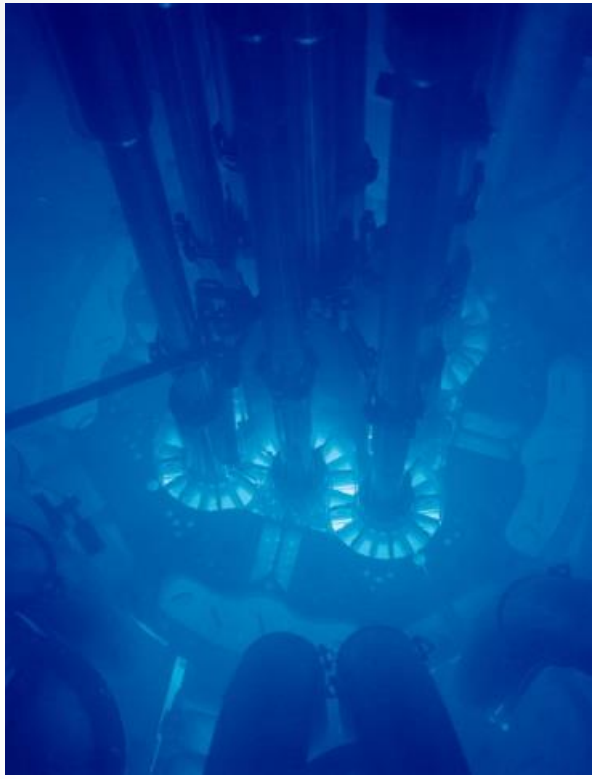
- When combined with indirect and induced impacts, INL operations (BEA's alone) add **$2.06 billion** to Idaho's total output
- The total employment impact of INL operations accounts for **2.1% of Idaho's employment**
- INL brought money into Idaho and generated **value-added output** of more than **$1.2 billion**
- INL accounted for more than **2.9% of statewide economic output**



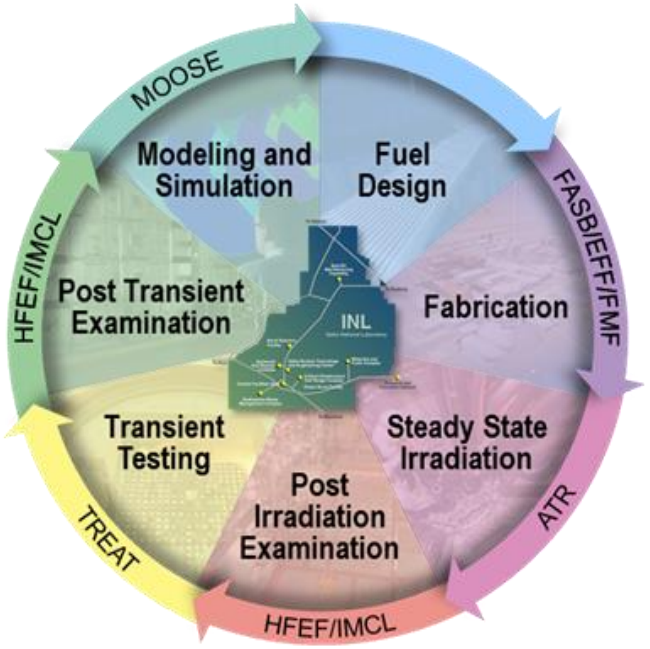
INL's 70 year history of supporting nuclear power in the U.S.

- EBR 1 - 1951
- SIW Submarine Thermal Reactor - 1953
- Materials Test Reactor – 1953
- Borax - 1954
- Engineering Test Reactor – 1957
- TREAT 1959
- EBR II - 1964
- Advanced Test Reactor – 1967
- Loss of Fluid Test Facility - 1976

Nuclear Science User Facilities and Enabling Capabilities



Advanced Test Reactor



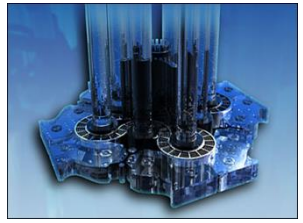
Hot Fuel Examination Facility

Transient Reactor Test Facility

Provides the research community a means to conduct cutting-edge nuclear energy R&D by providing access to unique irradiation and post-irradiation examination capabilities, located at Idaho National Laboratory and various partner facilities.

Purpose of the Advanced Test Reactor

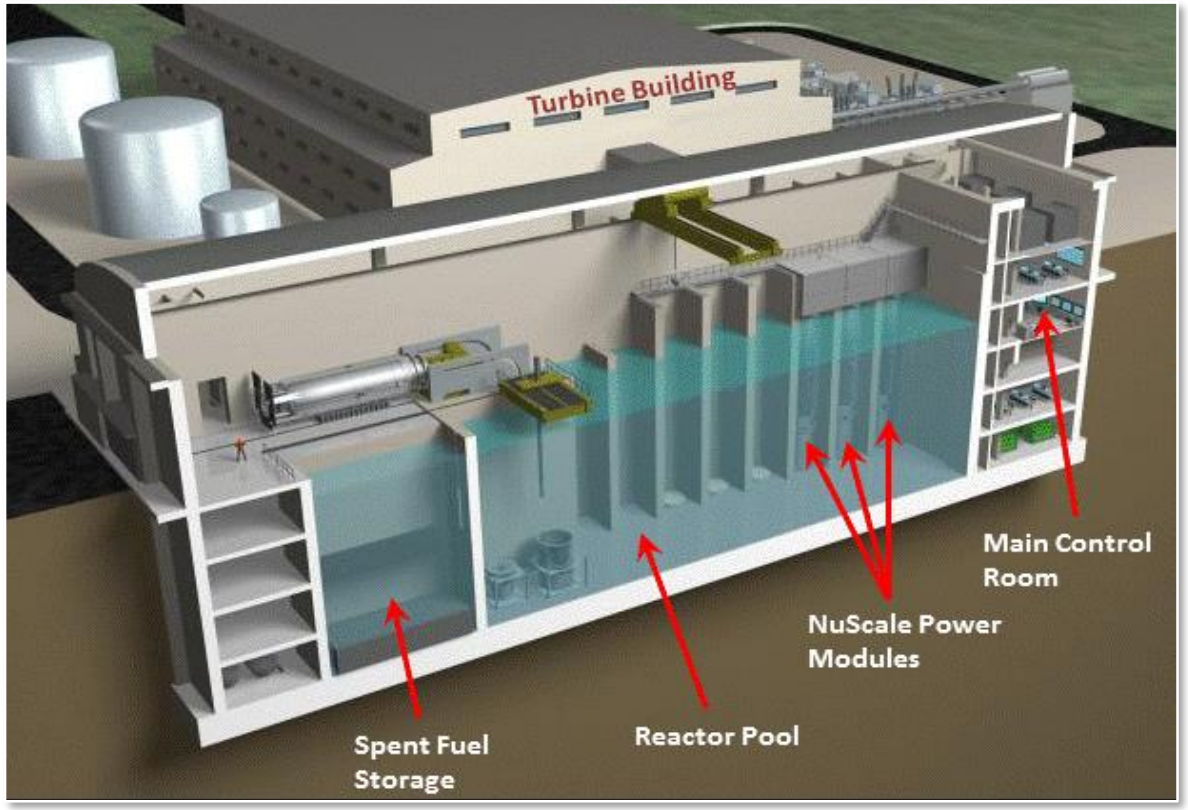
- What do we do?
  - We produce neutrons
  - Materials testing time machine
  - Medical isotope production
- For whom?
  - U. S. Navy
  - Universities
  - Nuclear industry worldwide
  - Medical applications
- Why?
  - U.S. Navy fleet sustainability
  - Advancement of nuclear energy technology
  - Cancer treatment



ATR
National Scientific User Facility

Small Modular Reactors (SMR)

- INL supports safe characterization, RD&D, and regulatory support for the first SMR anywhere in the world
- DOE granted a site use permit to Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) in February 2016 that enables UAMPS to locate a NuScale-designed SMR at the INL
- The Joint Use Module Plant (JUMP) concept is being developed to commercially demonstrate Hybrid Energy Systems (HES) and secure reliable microgrid applications
- Considerations for new INL electric power purchase agreement
- Other advanced reactor companies interested in siting in Idaho



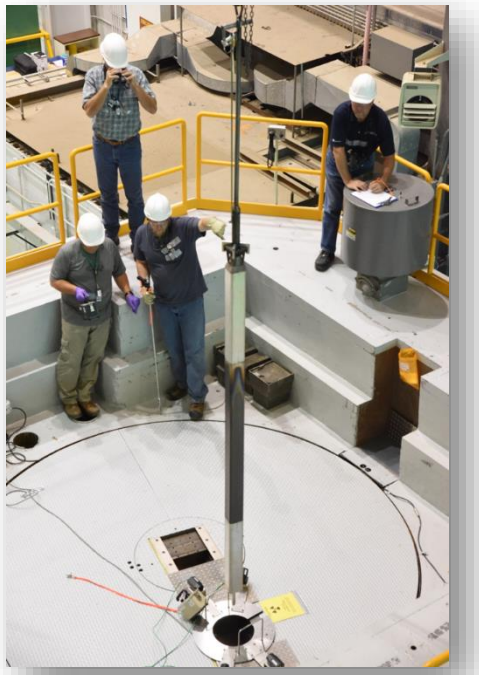
3-D view of six NuScale modules

Enabling Microreactors and Small Modular Reactors

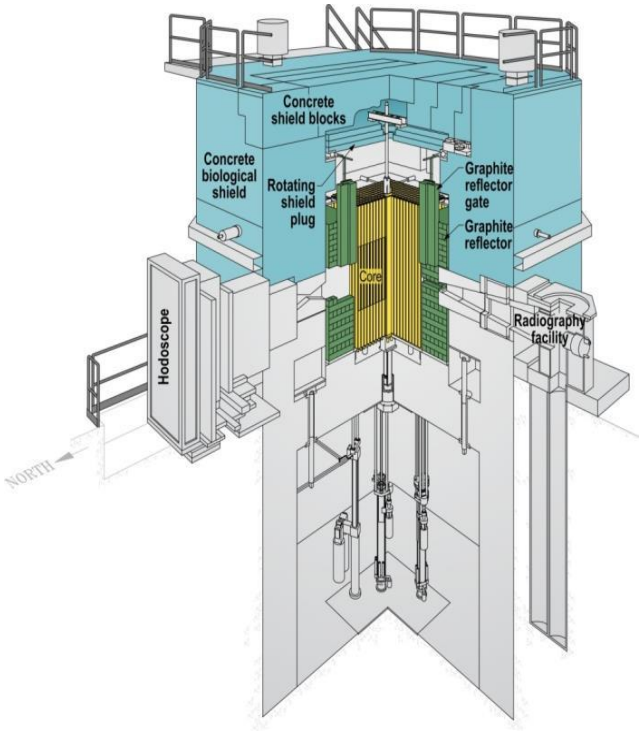
EBR-II dome being kept for microreactor development and testing

Resumption of Transient Testing Program TREAT

Transient Reactor Test Facility (TREAT) resumption of operations accomplished 12 months ahead of schedule and for nearly $20 million less than originally estimated



Fuel Assembly Lift from Core



TREAT Configuration & Unique Features

Top of the Reactor

Low Power Operations Resume at TREAT November 14, 2017

Irradiated Materials Characterization Laboratory (IMCL)

Advanced Post Irradiation Examination Capability utilizing state of art equipment

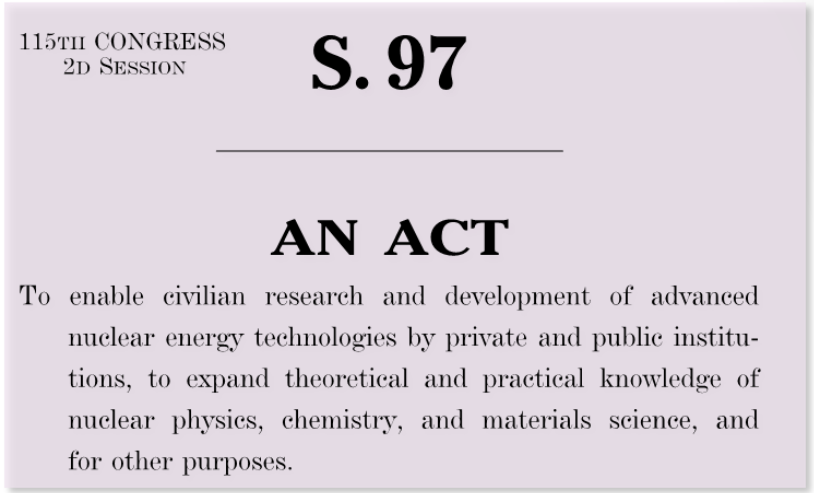
Recent Nuclear Energy R&D Legislation

- The **2018 Nuclear Energy Innovation and Modernization Act (NEIMA)** directs the U.S. Nuclear Regulatory Commission (NRC) to develop a "technology-inclusive licensing framework" for use by advanced reactor designers by 2027. NEIMA also directs the NRC to develop a licensing process for advanced reactors within two years

- The **2018 Nuclear Energy Innovation Capabilities Act (NEICA)** calls for construction of a fast neutron **Versatile Test Reactor** by 2026**.** Currently, the world's only fast neutron source reactor available to U.S. companies and capable of performing the needed tests is in Russia.

- NEICA also directs DOE to establish a **National Reactor Innovation Center (NRIC)**. The NRIC will be a place where private-sector companies can come and demonstrate advanced reactor concepts.

- Any commercial or DOE-operated reactors proposed for location at INL or anywhere else in the U.S. will be required under the 1970 National Environmental Policy Act (NEPA) to undergo extensive Environmental Impact Statement studies, which will of course involve public scoping meetings and consideration of all reasonable alternatives.

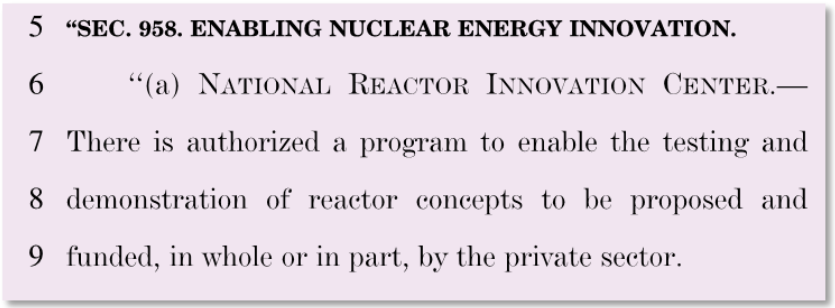


115TH CONGRESS
2D SESSION

S. 97

AN ACT

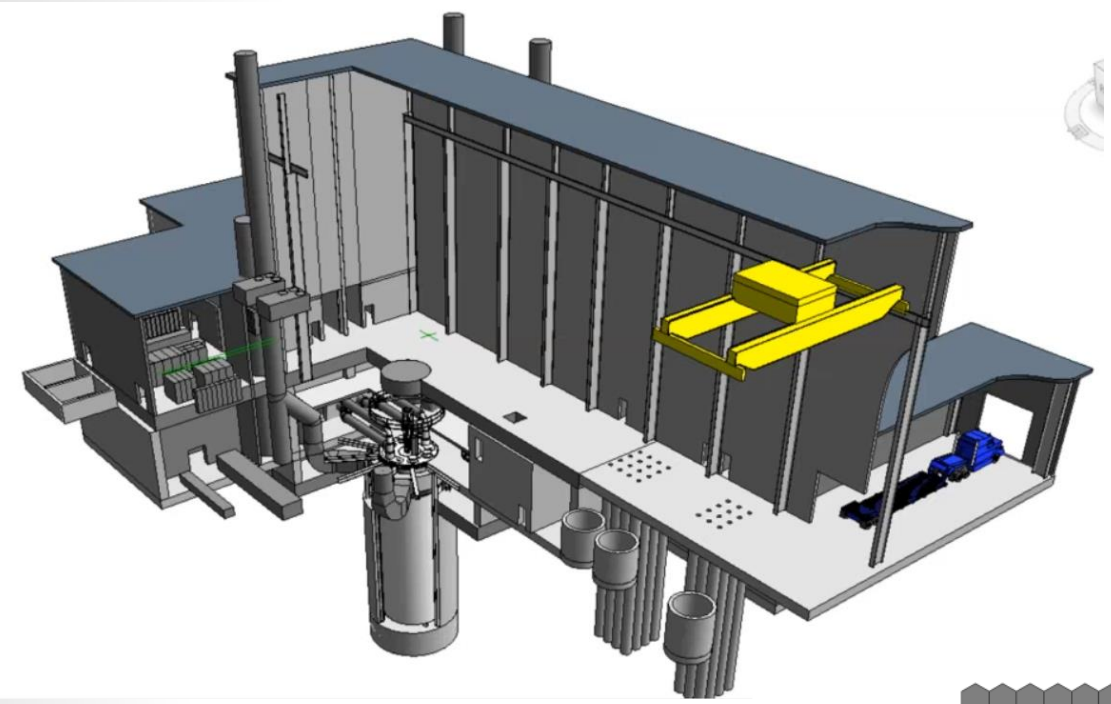
To enable civilian research and development of advanced nuclear energy technologies by private and public institutions, to expand theoretical and practical knowledge of nuclear physics, chemistry, and materials science, and for other purposes.

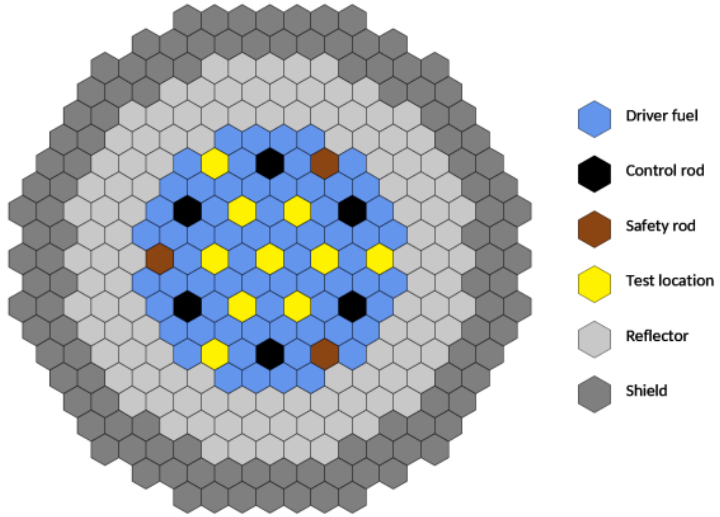


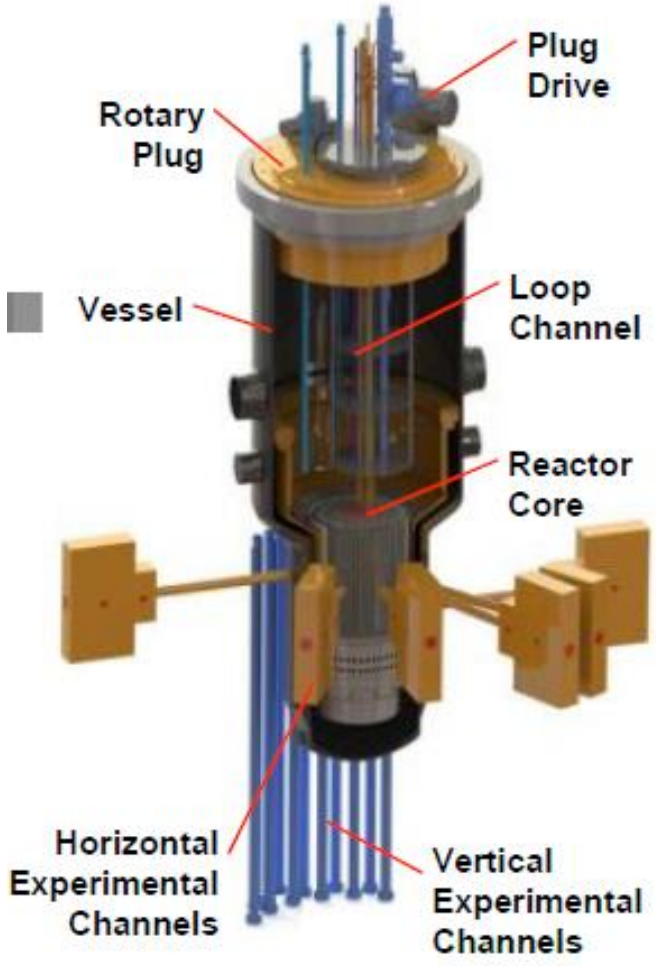
"SEC. 958. ENABLING NUCLEAR ENERGY INNOVATION.

"(a) NATIONAL REACTOR INNOVATION CENTER.—There is authorized a program to enable the testing and demonstration of reactor concepts to be proposed and funded, in whole or in part, by the private sector.

Versatile Test Reactor





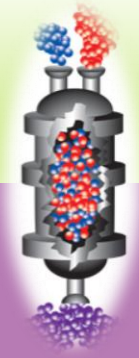


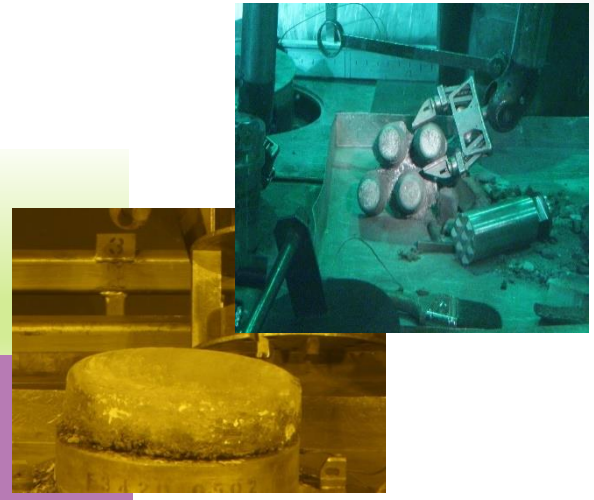
HALEU Interim and Long-term Stocks

- *Interim – Downblending current and/or recovered HEU in the federal complex*

HALEU

- Multiple physical forms (metallic, oxide, etc.)
- An array of U-235 enrichments (10-19.75%)
- Fast and thermal-spectrum reactor concepts
- Limited stocks available today



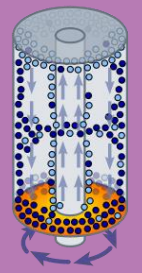


time

- *Long-term - Enrichment*

HALEU

- UF_6
- By 2021 demonstration quantities
- Commercial domestic source of HALEU



time

16

HALEU Interim and Long-term Stocks

- The Nuclear Energy Institute's 2018 survey of industry indicates need for ~600MT of HALEU by 2030
- HALEU provides more efficient fission (longer fuel life) in advanced reactors
  - Currently – refuel every 18 months
  - Advanced reactors – fuel lasts 10 to 17 years, followed by core replacement and core recycling
- Three DOE initiatives to supply HALEU
  1. EBR II Driver Fuel - Total of 10 MT HALEU at 1 MT/year (started)
  2. ZIRCEX-Integrated Processes – 5 MT/year of HALEU by 2025
  3. Centrus (Oak Ridge procurement) – commercial-scale production at Piketon, OH if large HALEU market is established

All three of these initiatives will proceed in compliance with the National Environmental Policy Act

National Security Programs

Impactful, Relevant, Urgent

- Electric Grid Security & Resilience
  - Control systems cyber security
  - Leading & integrating national effort
  - Strong utility & academic partnerships
  - Transforming the Nation's resilience through awareness, capability development, equipping & exercising
- Nuclear Nonproliferation
  - Understanding the nuclear threat
  - Minimizing & eliminating the threat
  - Responding to nuclear threats
- National Defense
  - Equipping our warfighters
  - Capabilities & technical solutions for national level needs

Sustaining This

Preventing This

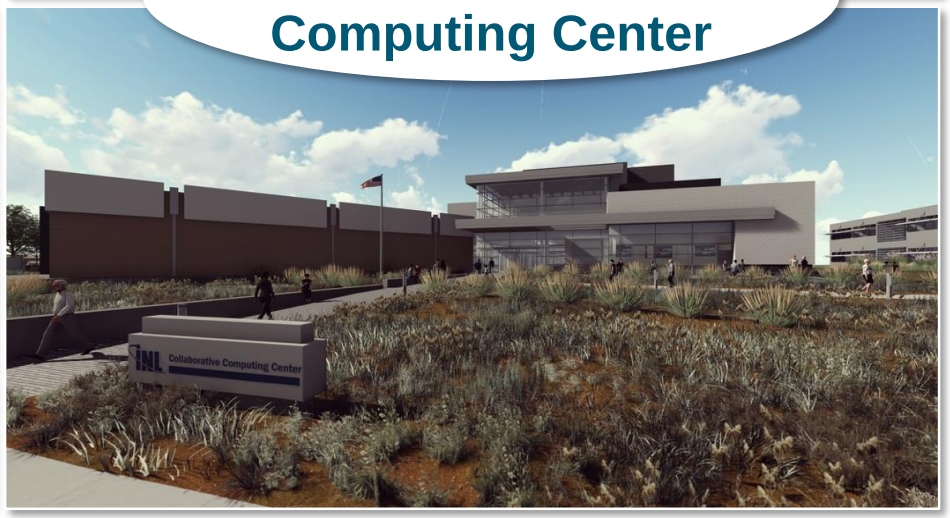
Armor Production

Range Testing & Training

Cybercore Integration Center and Collaborative Computing Center Status

Cybercore Integration Center

Collaborative Computing Center



Summary

NE and INL have important Missions that contribute to Energy Development and Security Improvement

- Advancing nuclear power as a resource capable of contributing to our Nation's clean energy, environmental, and national security needs
- Addressing technical issues, costs, safety, proliferation resistance, and security barriers through research and development
- Sustaining the Current Fleet of Light Water Reactors
- Small Modular Reactor Research Support
- Researching Advanced Reactor Materials and Fuel Types
- Nuclear Science User Facilities and Enabling Capabilities
- Attract and grow new talent
- Support U.S. readiness and response to evolving threats to our people, our critical infrastructure, and our installations