United States Naval Nuclear Propulsion Program

Idaho and the U.S. Navy: Mission, Stewardship, and Capabilities

LINE Commission Presentation

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Idaho's Critical Roles For the U.S. Navy

Lake Pend Oreille (Bayview, ID) Acoustic Research Detachment

- Though land-locked, Idaho is home to many cutting-edge Navy technologies
- Deep, still waters offer an ideal acoustic environment for stealth technology research and development
- Infrastructure to design, fabricate, outfit, and test large scale models
- Large scale models provide significant technical advantage and accurate prediction of full-scale performance
- Creating advantage in STURGEON, LOS ANGELES, SEAWOLF, VIRGINIA, COLUMBIA, and future class submarines

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Idaho's Critical Roles For the U.S. Navy

East Idaho

Naval Reactors Facility on the Idaho National Laboratory

- Naval spent fuel examination and irradiation for research and development
- Naval spent fuel management into road-ready dry storage
- Infrastructure-ready for shipments to a geologic repository
- Until 1995, trained nearly 40,000 sailors in the S1W, A1W, and S5G prototype reactor facilities

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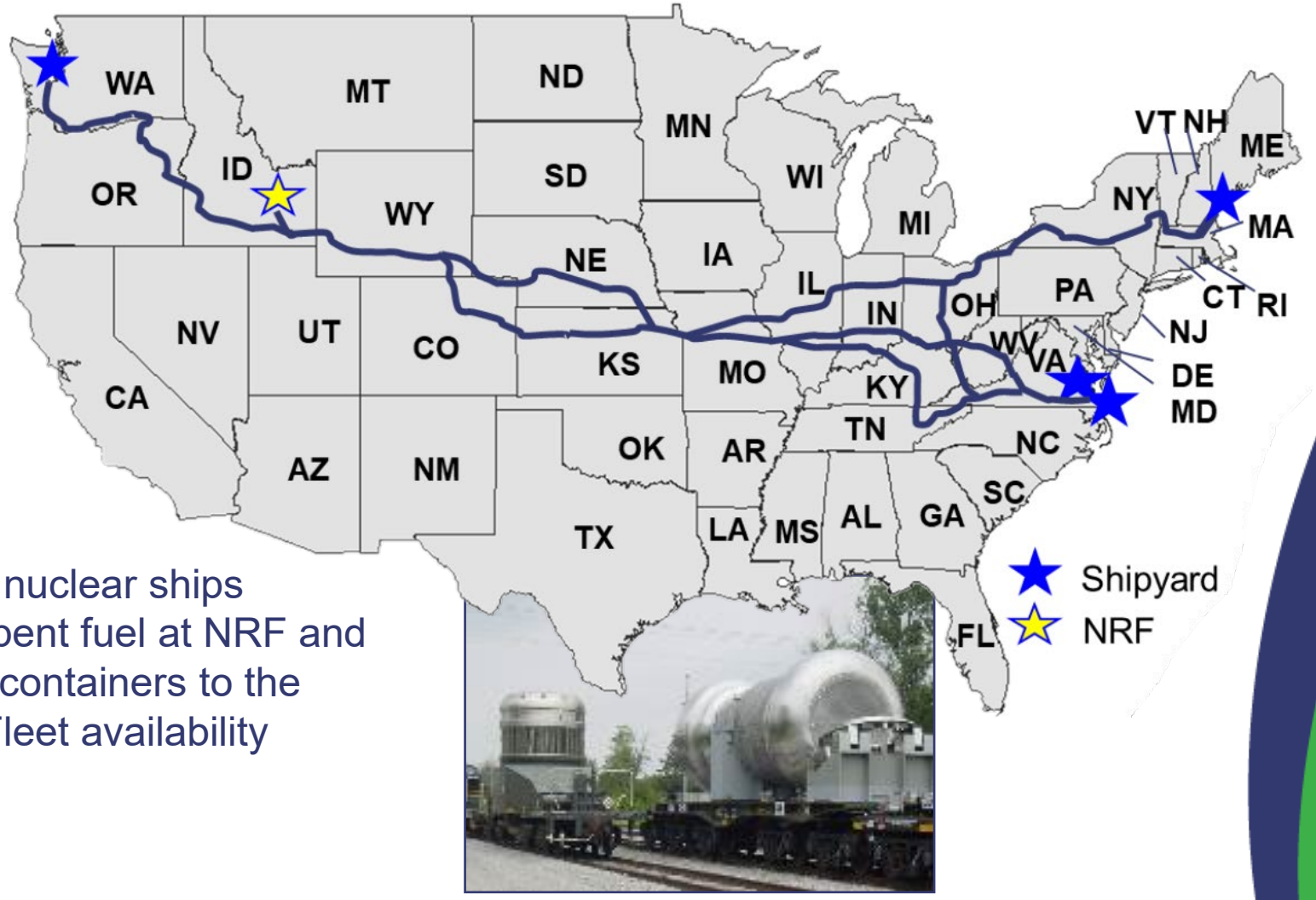
Supporting the Naval Nuclear Fleet in Idaho



- Refueling and defueling Navy nuclear ships requires timely unloading of spent fuel at NRF and turnaround of railcar shipping containers to the shipyards to maximize Navy Fleet availability

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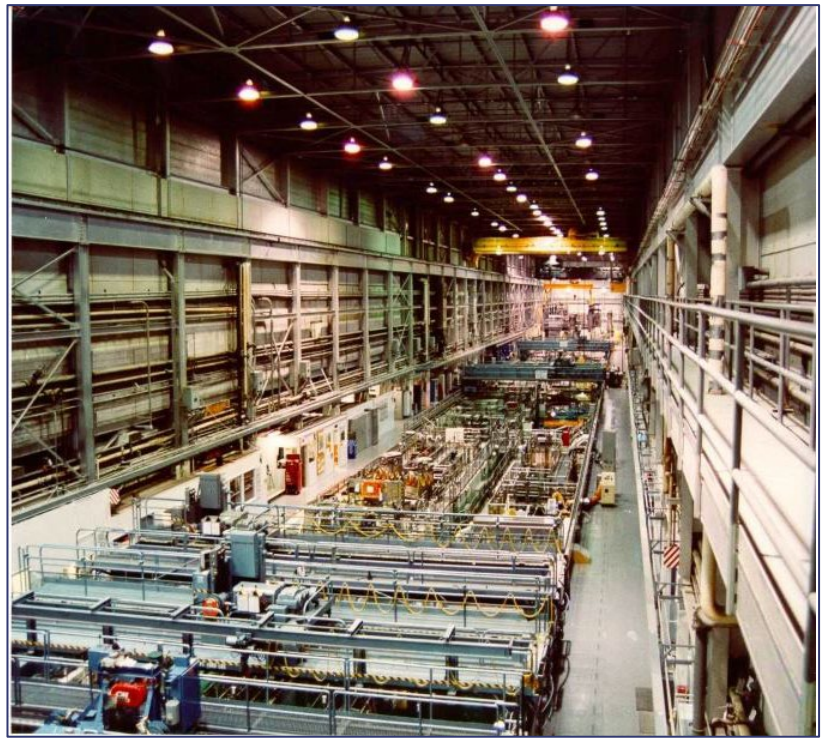
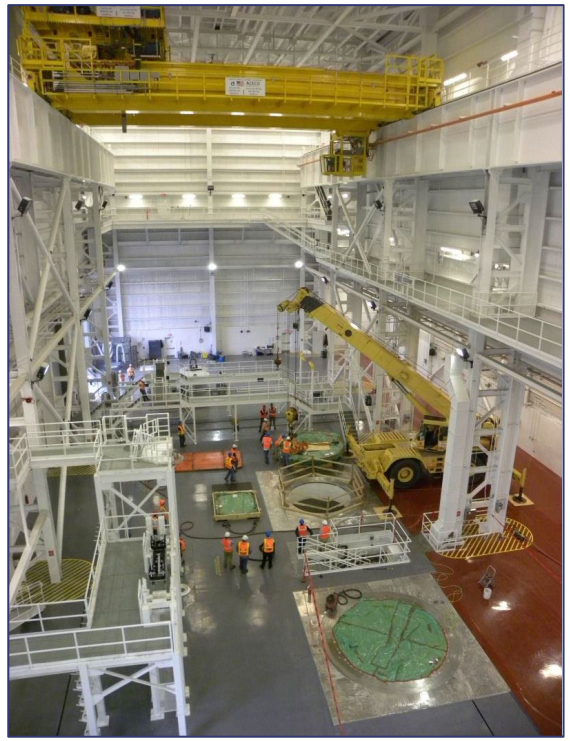
Naval Spent Fuel Management in Idaho

Expended Core Facility



Spent Fuel Packaging Facility

Cask Shipping and Receiving Facility



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Road-Ready Dry Storage

- ISA 2023 Milestone Complete
  - Met 18 months early (May 2021)
- Overpack dry storage
  - Vacuum-dried, seal-welded stainless-steel canisters
  - Enclosed in a concrete storage container with 3 ft thick walls
  - Stored in a purpose-built warehouse with a 3 ft thick, heavily-reinforced concrete floor
  - Routinely inspected and monitored
- Cask Shipping and Receiving Facility
  - Ready to be among first geologic repository shipments

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Research and Development in Idaho

- Routine inspection of all Navy spent fuel
- Examinations at NRF & Material Irradiations at ATR
  - ATR is the ONLY test reactor capable of providing the conditions necessary for Navy fuel system R&D
  - Current R&D supports key design and operating parameters for SEAWOLF, OHIO, VIRGINIA, COLUMBIA submarine class fuels
  - Prior R&D included: OHIO submarine ballistic missile class fuel for operating parameters and longevity between refuelings; NIMITZ aircraft carrier fuel which resulted in improved operating capability and improved future fuel design
- Emergent examinations

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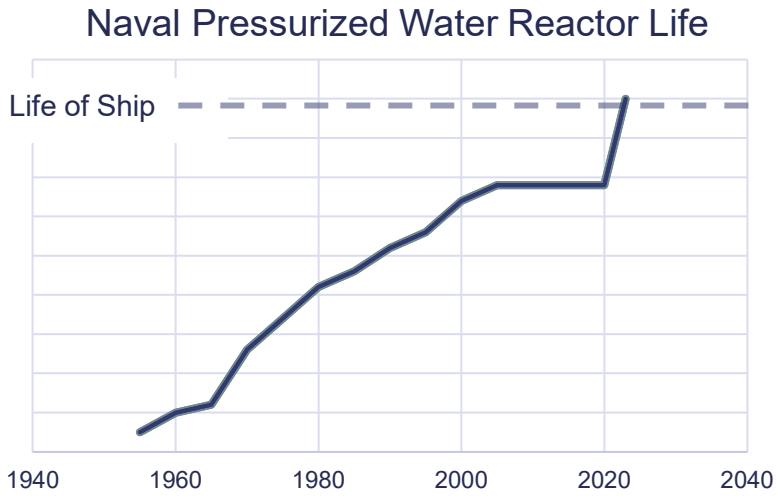
The Power of Research and Development in Idaho

- USS NAUTILUS (SSN 571)
  - First nuclear submarine was refueled after her first two years of operation having steamed about 62,000 miles
- Today's Nuclear Submarines
  - Life-of-the-ship fuel cores that will steam over one *million* miles
    - Fewer naval spent fuel cores
    - Fewer naval spent fuel shipments
    - Increased fleet availability
    - Decreased operational cost



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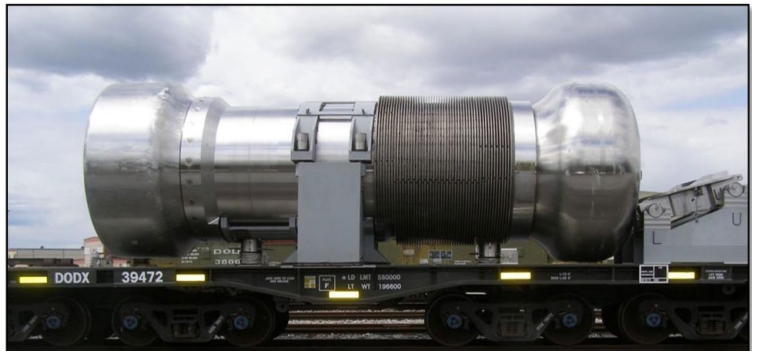
Stewardship in Shipping

- Since the 1950's, Navy has sent 919 spent fuel shipping containers, travelling over a course of 1.7 million miles (~60 times around the Earth)
- M-140 & M-290
  - Both meet stringent Nuclear Regulatory Commission Type B requirements
  - Conservative engineering, scale model testing, and computer modeling demonstrate that the shipping containers are designed to withstand severe real-world accidents and remain safe
  - M-290 is the first railcar to meet or exceed the Association of American Railroads Standard S-2043 requirements

M-140: Submarine spent fuel shipping container



M-290: Aircraft Carrier spent fuel shipping container

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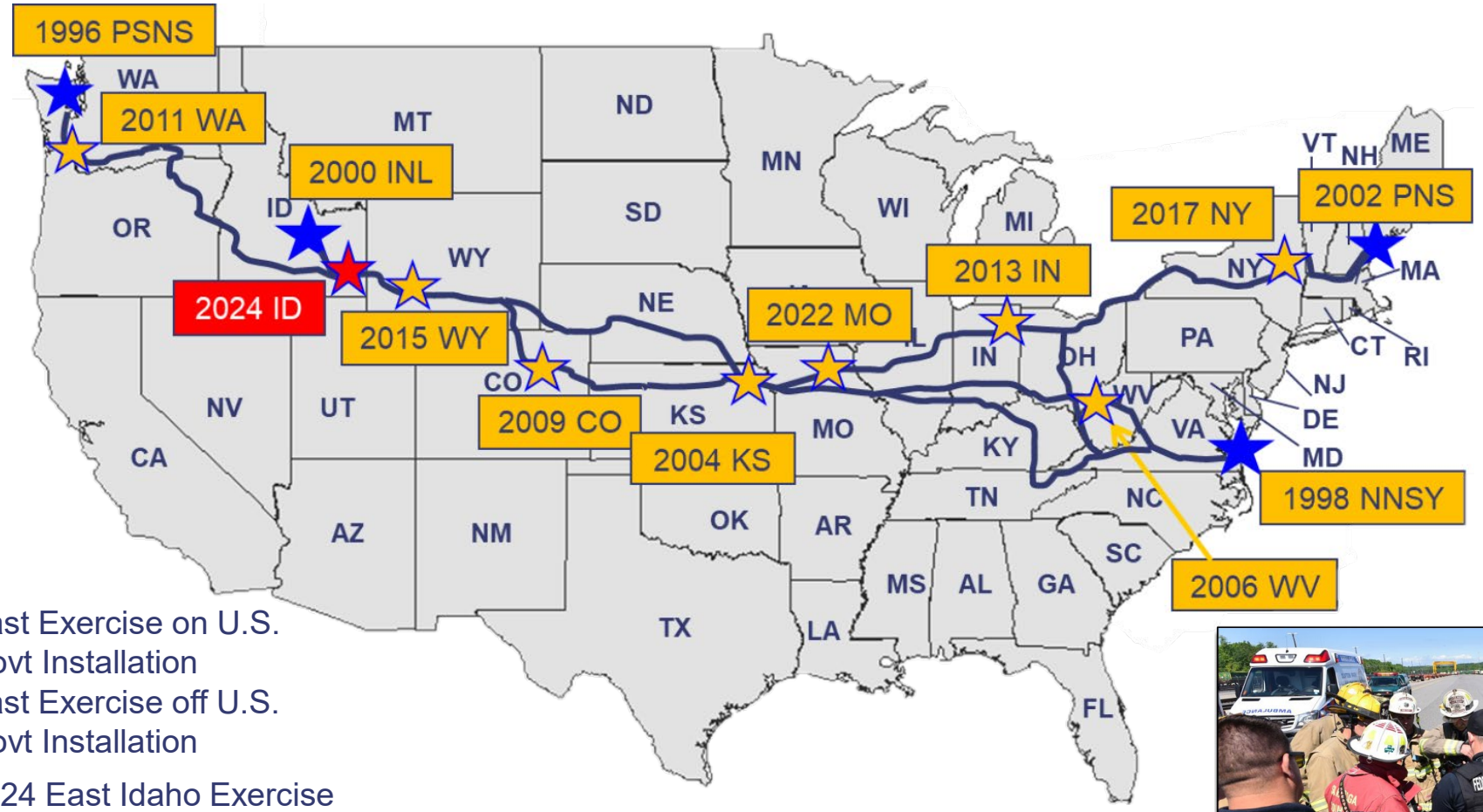
Stewardship in Community Training



- Past Exercise on U.S. Govt Installation
- Past Exercise off U.S. Govt Installation
- 2024 East Idaho Exercise

NNPP Shipment Couriers Integrate into Unified Command during the 2017 Accident Exercise in Mechanicville, NY

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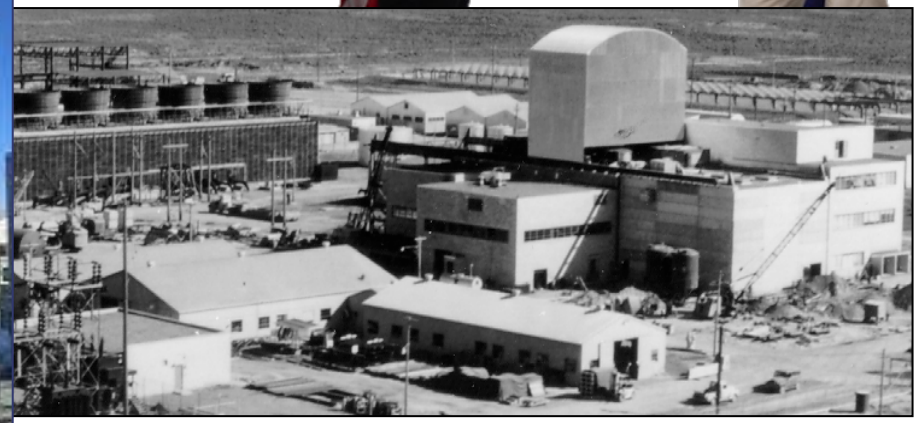
Stewardship in Facilities

- Remediation of Prototype Training Reactors
  - S1W to complete in 2026
  - A1W turnover 3 years early in November 2023
  - About $350M over 10 years
  - Partnering with DOE-EM and the Idaho Environmental Coalition



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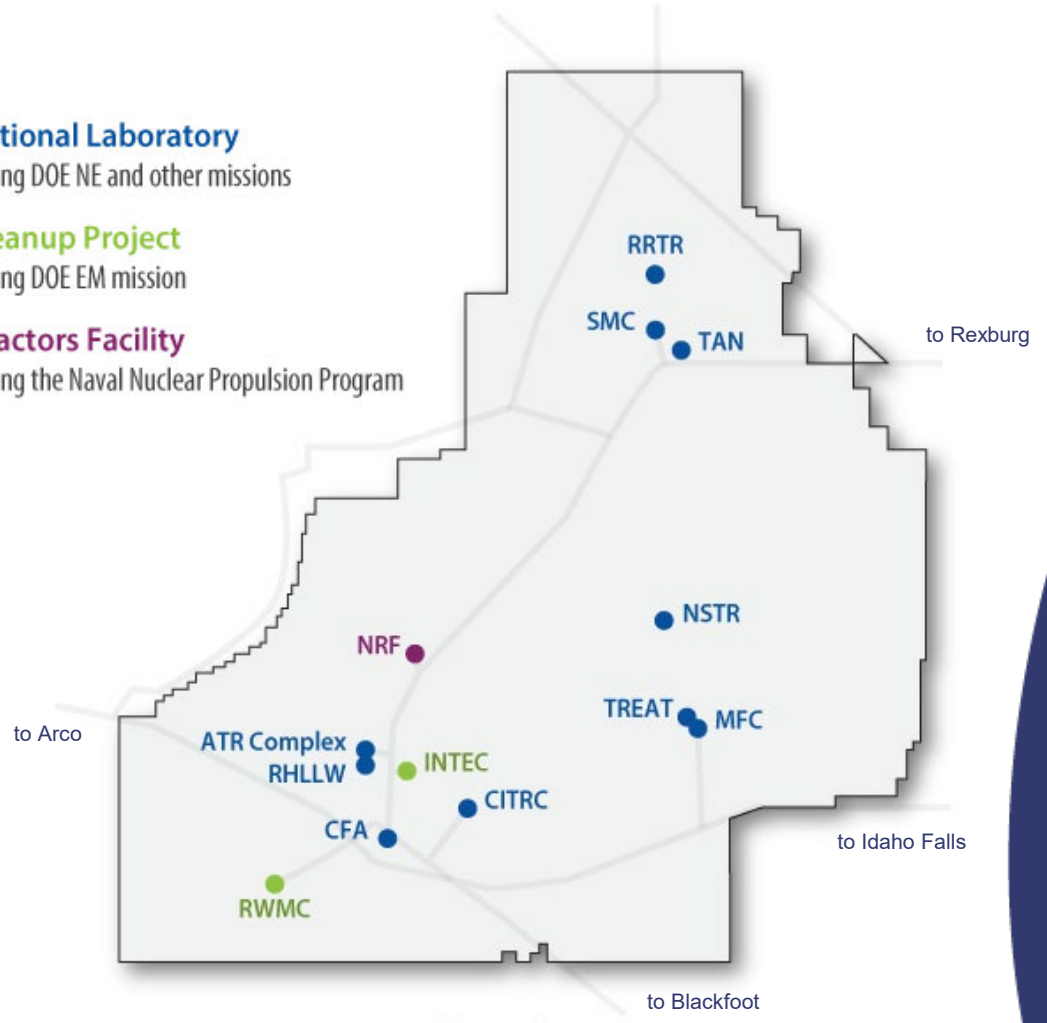
FY 2023 Direct Economic Impact in Idaho: ~$1B

- Naval Reactors Facility & Recap
  - ~$860M; ~1500 staff & support
- Acoustic Research Detachment
  - ~$21M; ~110 staff; ~2000 visiting test personnel
- INL ($ provided by Naval Reactors)
  - ATR – Irradiated Materials
  - MFC – Material Testing
  - INTEC – S1W Core Car
  - RDF – Waste
  - ~$150M
- Prototype Reactor Remediation
  - ~$30M



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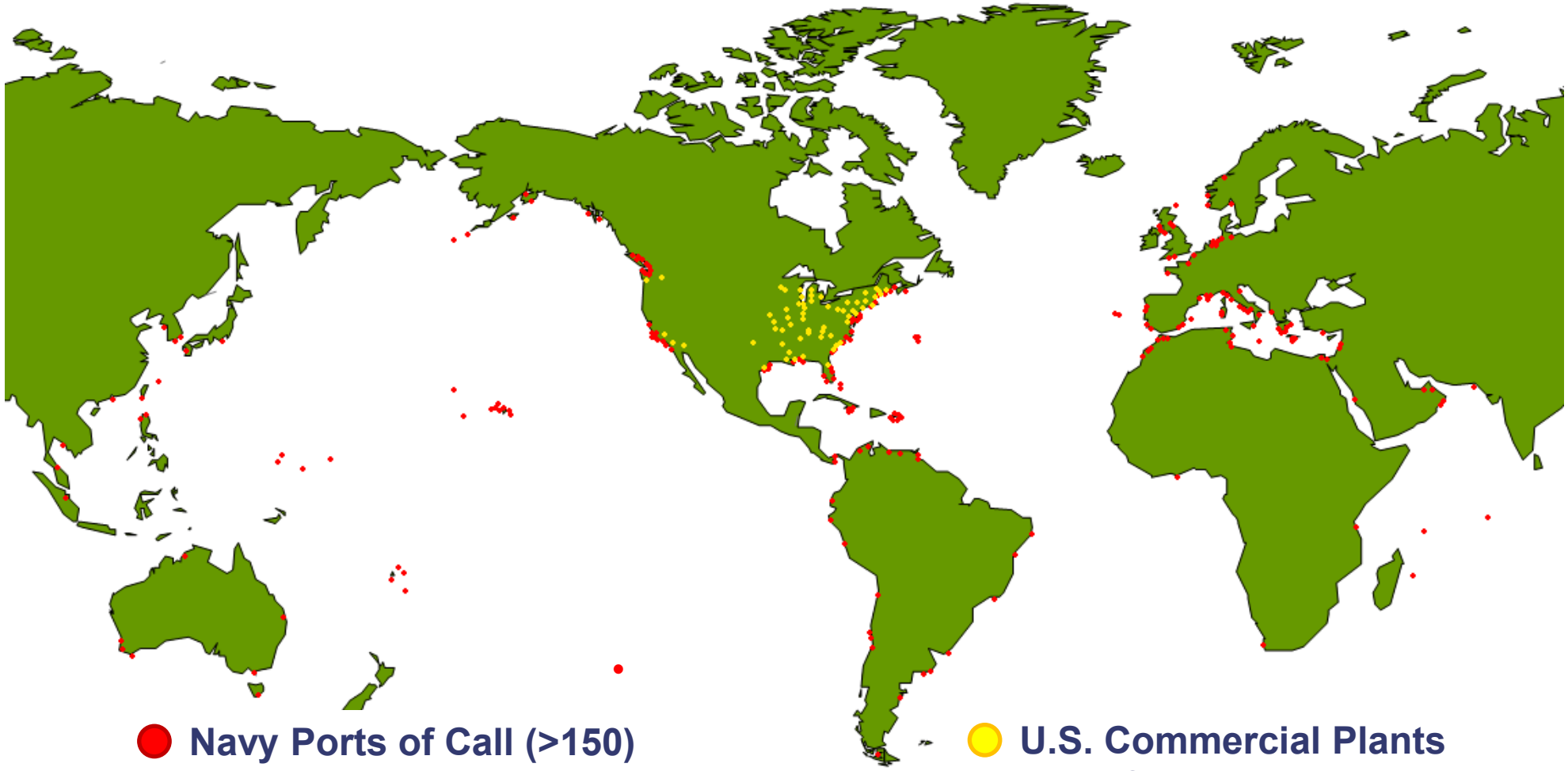
Impeccable Safety Record Around the World



Navy Ports of Call (>150)
97 Operating Reactors

U.S. Commercial Plants
93 Operating Reactors

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Comparison of Navy and Commercial Design

Navy

- Conservative, battle-hardened design for strategic advantage and survivability
- On the move! Pitch, yaw, roll
- Small reactor compartment
- Dynamic environment
- Life of the ship fuel
- Small crew in close-proximity

Commercial

- Optimum design for power generation
- Permanent location
- Large facility
- Fixed environment
- Frequent refueling
- Large, rotating operating crew

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