

# ***DOD Mobile Microreactor***

[www.inl.gov](http://www.inl.gov)



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## ***In a War Zone, Energy Logistics are Critical***

**Fuel and water account for 70%–90% of land transport missions**

**Between Oct 2001 and Dec 2010, 52% of OIF and OEF casualties occurred from hostile attacks during land transport missions**

***“Relieve the dependence of deployed forces on vulnerable fuel supply chains”***

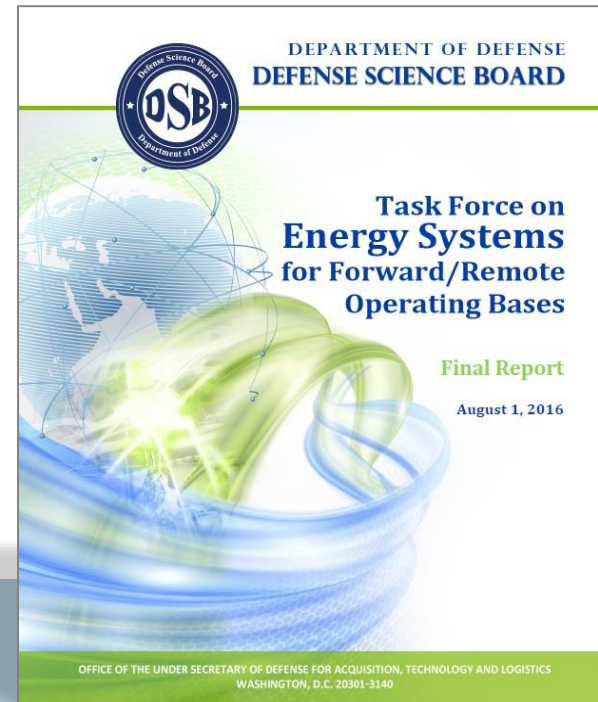
***– Commanding General, 1st Marine Division in OIF***



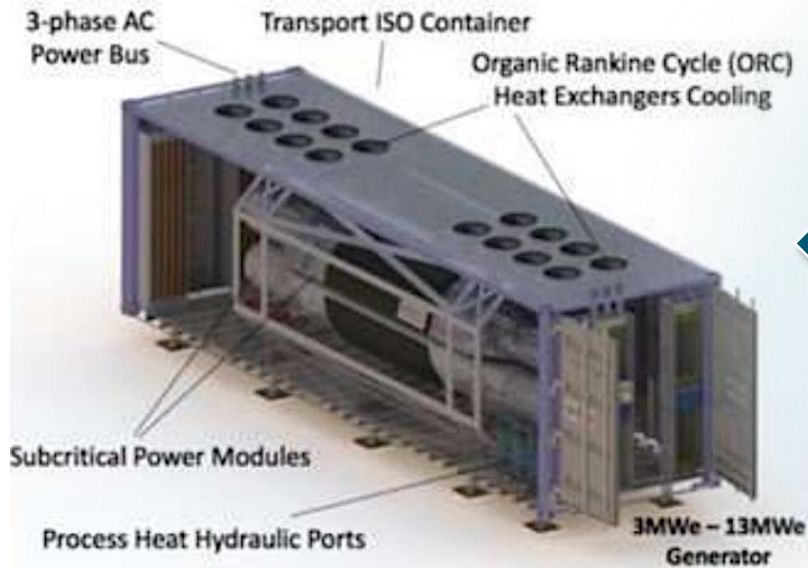
# Portable Nuclear Power: Why Now?

- Defense Science Board (DSB) in 2016 identified critical growing energy challenges
- Significant technological advances in nuclear power since the 1960s

**DSB Conclusion:** “There is opportunity to invert the paradigm of military energy. The U.S. military could become the beneficiaries of reliable, abundant, and continuous energy through the deployment of nuclear energy power systems.”



# Nuclear Power is an Expeditionary Game Changer



2-3 days

4-7 days



*Images are for representational purposes only. No federal endorsement intended.*

# Advanced Nuclear Reactors are Already Here

**Floating Nuclear Reactor**  
*(in service July 4, 2019)*



**Nuclear Torpedo**



**Nuclear-Powered Cruise Missile**



**Nuclear Power Plans For South China Sea**



**First Gen-IV Nuclear Reactor**

## ***DoD – Mobile Microreactor***

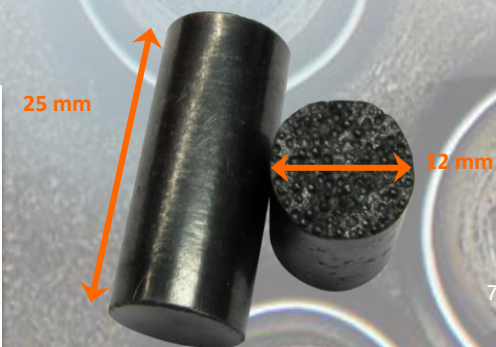
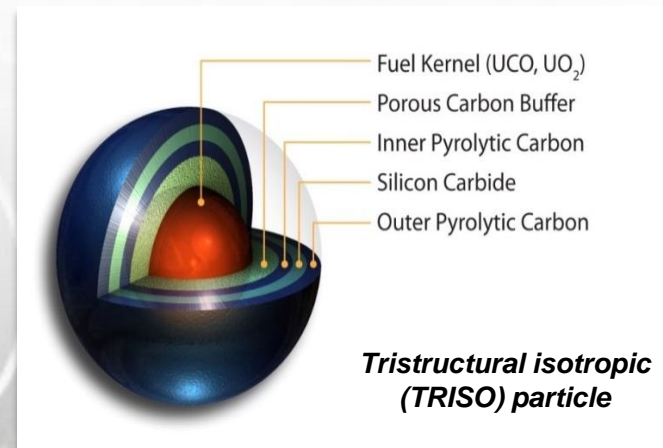
- **A DoD prototype reactor**
- **1-5 MWe**
- **Factory built and installed onsite**
- **Scalable**
- **Produces electricity, heat, steam**
- **Deployed at DOE site by 2024**



***Holosgen™ Deployment at Remote Site***

# TRISO Fuel: A Paradigm Shift for Nuclear Power

- The Advanced Gas Reactor (AGR) Fuel Development Program was initiated in 2002
- Silicon carbide keeps fission products sealed inside, meaning that a containment vessel failure is no longer necessarily catastrophic.
- Pellets as the first line of containment is a paradigm shift for nuclear regulations/safety



## Project PELE

- **2019 NDAA language: DoD prototype and demonstrate a small nuclear reactor.**
- **USD(R&E) Michael Griffin tasked SCO to develop mobile nuclear reactor prototype.**
- **Whole of government/industry approach:**
  - MOU between SCO, DOE, and NRC
  - DOE providing authorization, technical demonstrations, transportation regulatory pathway, and siting assistance.
  - Army Corps of Engineers is technical lead on NEPA EIS
  - NNSA will provide fuel, assist on transportation regulations and radiation shielding.
- **Initial concept (notional, no site chosen) – deploy at INL, then move on INL site – re-deploy**

One Hundred Fifteenth Congress  
of the  
United States of America

AT THE SECOND SESSION

*Began and held at the City of Washington on Wednesday,  
the third day of January, two thousand and eighteen*

An Act

To authorize appropriations for fiscal year 2019 for military activities of the Department of Defense, for military construction, and for defense activities of the Department of Energy, to prescribe military personnel strengths for such fiscal year, and for other purposes.

*Be it enacted by the Senate and House of Representatives of  
the United States of America in Congress assembled,*

SECTION 1. SHORT TITLE.

(a) IN GENERAL.—This Act may be cited as the “John S. McCain  
National Defense Authorization Act for Fiscal Year 2019”.



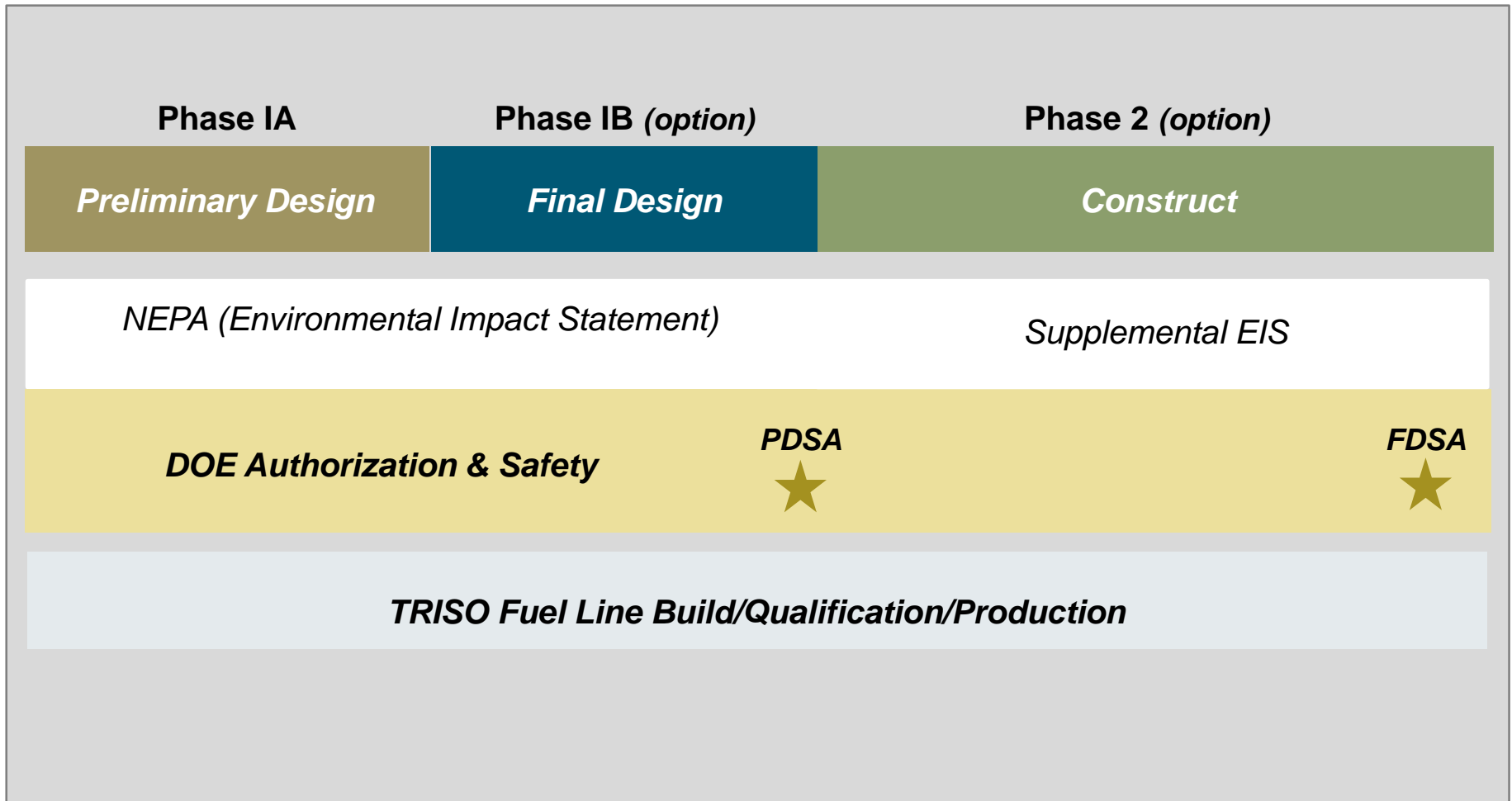
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## ***Project PELE: Current Status***

- **Market research into Generation IV reactor options for the DoD has been conducted.**
  - DOE RFI released **September 13, 2018.**
  - USD(R&E)/SCO RFI released **January 18, 2019.**
  - USD(R&E)/SCO Industry Day conducted **March 8, 2019.**
  - USD(R&E)/SCO RFS released **April 29, 2019.**
  - RFS responses received **June 10, 2019.**
- **SCO concluded that a design, build, and demonstration reactor within DSB study recommendations is feasible within the next five years.**
  - 1-5 MWe, 3+ years lifetime, HALEU fuel, inherently safe, <40 tons, transportable in a C-17 and by truck, assembled in <3 days, disassembled/transportable in <7 days, minimally operated, black-start capable, minimal proliferation/safety risks.

# DoD Microreactor: Parallel Workflow



## ***The INL and FFRDC Role***

- **INL has an SPP for a Senior Technical Advisor and SME support signed in January 2019**
- **Additional SPP between DOE and INL signed September 2019 covers INL activities in:**
  - Documented Safety Analysis preparation and submittal
  - Destructive testing of reactor and TRISO fuel
  - NEPA support
  - Transportation
  - Re-establishment of TRISO fuel production line
    - MOA currently being negotiated between DOD and NASA
  - DOE-ID time for PELE support and authorization approval process
- **ANL is the TPOC for the SME team**
- **The FFRDC's will be supporting design teams**
- **Potential Opportunities**
  - Siting and logistics, facility preparation, operation and maintenance, movement of the mobile microreactor onsite, testing

## ***Conclusions***

- **There is a clear need for a reliable/resilient power source for DoD which does not also require a long/vulnerable logistics tail.**
- **Idaho National Laboratory has the capabilities and facilities necessary for microreactor demonstration.**
- **Microreactor work at INL is providing new opportunities.**



