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ANS

National Laboratories and Fission Surface Power (FSP)

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National Laboratory Roles

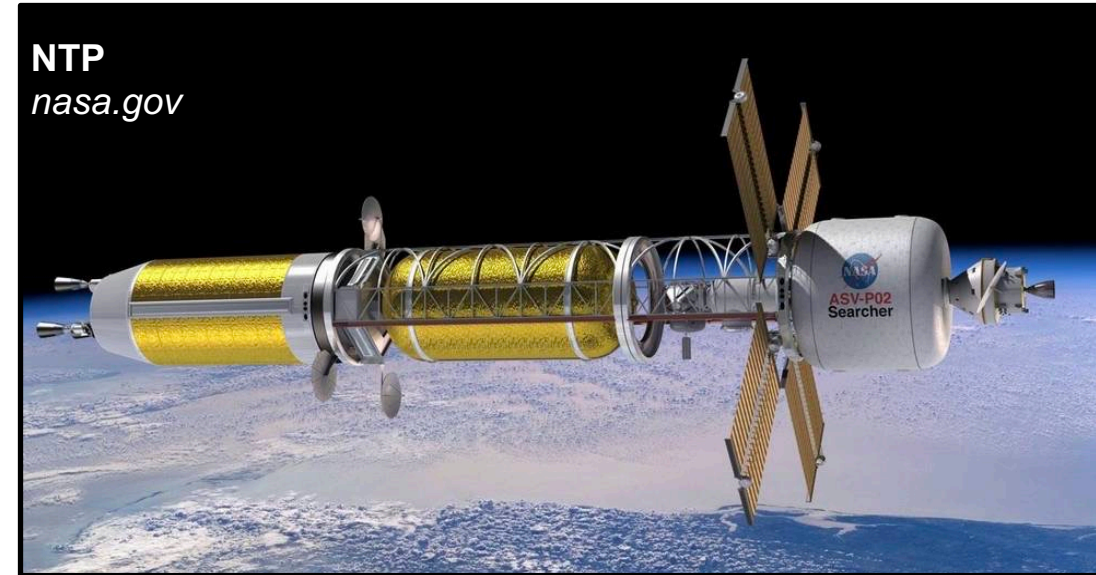
- Idaho National Laboratory (INL) and Los Alamos National Laboratory (LANL) roles in space reactor projects:
 - Provide contract administration (INL)
 - Perform technology maturation and facilitate technology transfer to industry (INL/LANL)
 - Support preliminary design option studies and requirements development (INL/INL)
 - Assist with high-assay low-enriched (HALEU) fuel availability
 - Provide technical oversight for reactor design and development.
 - Including ground-based prototype

Provide constructive support and guidance



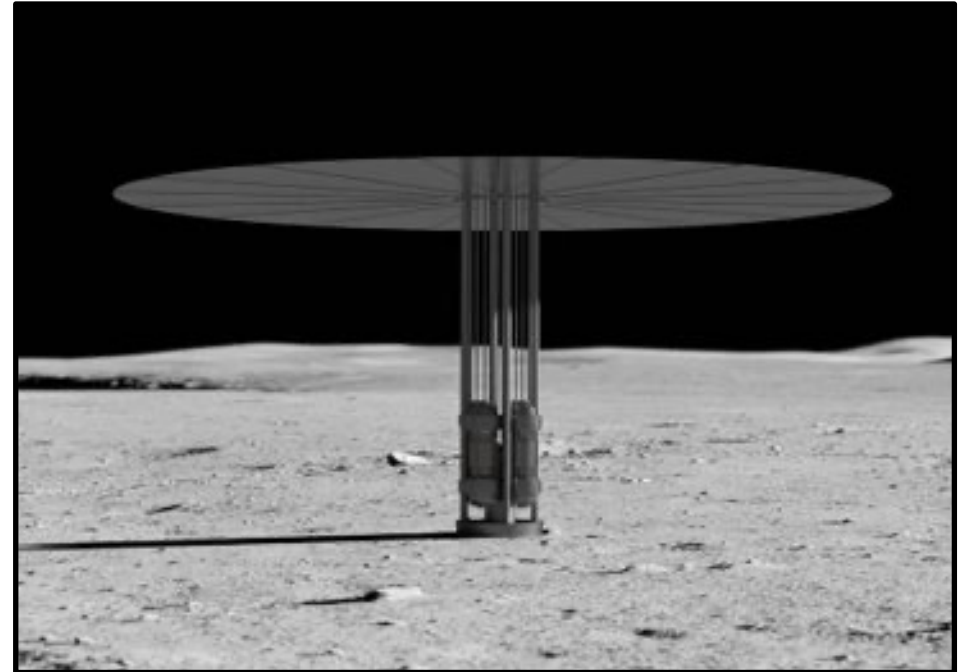
Nuclear Thermal Propulsion

- Develop an NTP reactor and engine technologies capable of sending humans to Mars in the 2030's
- 3 \$5M Design Contracts started in 2020
 - BWX Technologies
 - General Atomics Electromagnetic Systems
 - Ultra Safe Nuclear Technologies
- Technology Maturation Efforts
 - Fabrication of high-temperature fuels (e.g., HALEU UN)
 - Irradiation Testing & PIE
 - TREAT irradiation test: Fall 2020,
 - H-cooled TREAT test FY2023
 - Modeling & Simulation, technical analysis



Fission Surface Power

- Provide 40kW_E for 10 years, ready for a lunar demonstration mission in late 2020's
- Phase 1 Design Effort: Three awards at \$5 million apiece
 - Teams selected:
 - IX
 - Westinghouse
 - Lockheed Martin
- Technology Maturation
 - Solid Moderator development
 - Radiation Hardened Instrumentation & Control



- **Key Deliverables**
 - System/subsystem requirements, drawings and interfaces
 - Mass properties
 - Technical readiness assessment
 - Cost/schedule projection for Phase 2



Idaho National Laboratory

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.