Small Self-Regulating Fission Reactor System

LA-UR-15-22359

This document is approved for public release; further dissemination unlimited
Small Self-Regulating Fission Reactor System
A power system for special government applications

BACKGROUND & MOTIVATION
For Space: Primary source of power for NASA missions (Pu238) is in limited supply and production of new material may not cover future missions.

For DoD: Delivering fuel to remote military bases is costly and risky. Fuel convoys are often attacked and results in casualties. A low cost, long lasting power solution, that does not require refueling is needed.

INNOVATION
A small self-regulating fission reactor made with U235.

Why U235?
U235 is plentiful and could mitigate the shortfall in Pu238 and increase the ability of future missions.

DESCRIPTION
How it works:

LANL and NASA continue to mature the design and are preparing for the development of a prototype unit. Materials chosen for the design will be well characterized and abundant.

Recent progress:
LANL and NASA with the support of NSTec performed a proof of concept test at the Nevada Test Site.

Technology Readiness Level (TRL) 5
- Reactor core is ready for demonstration.
- Power conversion system ready for deployment.

ANTICIPATED IMPACT
For Space: With a small fission system, missions to the outer planets are more likely and at a power level much higher than previously believed.

For mobile platforms, including DoD: Small self-regulating fission reactors can also be built for ground and mobile platforms, delivering safe, reliable, extremely long lasting power solutions.

PATH FORWARD
1st – Start with space applications:
- LANL and NASA Glenn Research have begun development of the reactor concept. NASA management has decided to make small fission its No. 1 priority for nuclear energy investment going forward.

2nd – Identify DoD first adopters
- Find DoD customers who can help fund development of a first prototype for mobile land and underwater applications.

Potential End Users:
- NASA, DoD, Energy Companies

Point of Contact: Patrick McClure, NEN-5, pmcclure@lanl.gov (505)667-9534