

## **FUEL AND MODERATOR DEVELOPMENT STRATEGY FOR NEP SYSTEMS**

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### **ABSTRACT**

Nuclear electric propulsion (NEP)-powered vehicles have been contemplated for human Mars missions. The nuclear power system contemplates using a high temperature light-weight nuclear reactor for the production of electrical power in the range of 2-5 MWe with a 3-10 year service life.

There are several reactor and moderator options that exist for an NEP reactor with these operational needs. One option under consideration is a hydride moderated reactor using a fuel comprised of high assay low enriched uranium (HALEU) compounds. The NEP fuel-moderator mixtures share development challenges with NASA's Nuclear Thermal Propulsion (NTP) and Fission Surface Power (FSP) projects. The operational requirements also align well with development and investments in commercial microreactor solutions. This paper will describe a structured approach for developing a multi-year strategy for maturing NEP fuel and moderator materials. Touchpoints where NASA could benefit from and be of benefit to the ongoing commercial investments are also described and discussed.