Nuclear reactors to support future lunar and Mars robotic and manned missions impose new and innovative technological requirements for their control and protection instrumentation. Long duration surface missions necessitate reliable autonomous operation, and manned missions impose the added requirement of fail-safe reactor protection systems. There is a need to define an advanced instrumentation and control system for space-nuclear reactors that addresses both aspects of autonomous operation and safety. The constraints and conditions imposed on instrumentation for earth-based reactors are stringent enough to provide an excellent reference for a similar space-based system. However, these systems are typically analog-digital hybrids, and are not optimized for mass, volume, or power consumption. As a result, there is currently no earth-based reactor control system that is practical for use in space. We propose to develop a comprehensive reactor instrumentation and control system based on proven technology used at nuclear research facilities, for operation in the space environment and in particular for nuclear surface power facilities. The heritage established by these terrestrial 'reference' reactors through years of flawless operation on earth make them ideal candidates on which to base a compact, fully-digital space instrument for the control and protection of nuclear surface power systems.

* Information listed above is at the time of submission. *