

BRIEFING CHART

<p>NASA SBIR/STTR Technologies A Two-Phase Cooling Loop for Fission Surface Power Waste Heat Transport PI: Jay C. Rozzi, Ph.D., Creare Incorporated, Hanover, NH Proposal No.: 09-X7.02-9282</p>	
<p>Identification and Significance of Innovation</p> <p>Current lunar-based Fission Surface Power (FSP) Systems that will support sustained surface outposts consist of a nuclear reactor with power converters, whose waste heat is transported by a heavy, pressurized water cooling loop to radiator panels to be rejected to the environment.</p> <p>All of these heavy components, including the water, must be transported from Earth to the lunar surface, consuming valuable launch space and weight.</p> <p>Our innovation is a Lightweight Cooling Loop (LCL) that is comprised of a two-phase water loop and a capillary pumped liquid return.</p> <p>Using our approach, we estimate that our LCL will reduce the cooling loop system mass by 60% compared to the current approach.</p> <p>Our approach will have a reduced system pressure, resulting in decreased plumbing size and weight, and eliminate the need for a mechanical pump, increasing system reliability.</p> <p>Expected TRL Range at the beginning and end of Contract (1–9): 2-4</p>	<p style="text-align: center;">Our Innovative Lightweight Cooling Loop (LCL)</p>
<p>Technical Objectives</p> <p>Fabricate a Proof-of-Concept LCL Evaluate the Thermal Performance of the LCL Develop a Preliminary Plan to Scale Up</p> <p style="text-align: center;">Work Plan</p> <ul style="list-style-type: none"> • Task 1. Design Proof-of-Concept LCL • Task 2. Fabricate Proof-of-Concept LCL • Task 3. Demonstrate Performance • Task 4. Plan Scale-Up • Task 5. Manage and Report 	<p style="text-align: center;">NASA Applications</p> <p>Fission Surface Power (FSP) Systems to support In-Situ Resource Utilization (ISRU) or Mars robotic and manned missions</p> <p style="text-align: center;">Non-NASA Applications</p> <p>Large scale computing facilities, radar, aerospace, large scale power systems, and energy recovery applications</p> <p style="text-align: center;">Contacts</p> <p>Jay C. Rozzi, Ph.D., jcr@creare.com Josh K. Hilderbrand., jkh@creare.com</p>