

## **CIF 22-6: Input Waste Stream Modeling for Trash Management, Recycling, and Manufacturing Processes**

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**Activity Type:** New Start

**Primary STMD Taxonomy:** TX06.1.3 Waste Management

**Start TRL:** 1

**End TRL:** 3

**Executive Summary:** Astronaut waste is an important aspect of the planning and execution of long-term crewed missions, especially to the Moon and Mars. However, as new technologies arise and mission planning evolves, the projected composition of the waste similarly evolves. This poses a problem for researchers who are investigating various approaches to mitigating crew waste, since the investigation of each new waste-mitigation technology typically uses a static waste composition that is based on a simulant developed at the time of the research; several such waste simulants have been developed over recent years. To mitigate the 'moving target' aspect of crew waste composition and use, researchers at NASA KSC have developed a computational tool wherein researchers can adjust the composition of the crew waste, as well as other important parameters such as crew size, mission duration, and waste mitigation method (e.g., incineration, compaction, jettison, etc.). The computational tool then returns important mission metrics such as waste-related mass reduction, power consumed, water produced or consumed, elemental mass balance, and available feedstock for in-space manufacturing (ISM) applications. This tool can then be used to adjust aspects of a waste model (e.g., removal of metal aluminum (Al) for ISM applications) and determine an associated set of metrics in order to inform mission planning.