

# Source Contaminant Control System Design, Operation, and Testing for the Trash Compaction and Processing System

Janine Young<sup>1</sup>  
*KBR, Houston, TX, 77002*

Serena Trieu<sup>2</sup>  
*Logyx LLC, Mountain View, CA, 94043*

Steven A. Sepka<sup>3</sup>, Tra-My Justine Richardson<sup>4</sup>, Jeffrey M. Lee<sup>5</sup>, Kevin R. Martin<sup>6</sup>  
*NASA Ames Research Center, Moffett Field, CA, 94035*

Gregory S. Pace<sup>7</sup>  
*KBR, Houston, TX, 77002*

*and*

Jurek Parodi<sup>8</sup>  
*Bionetics Corporation, Yorktown, VA, 23693*

**The Trash Compaction and Processing System (TCPS) aims to reduce volume, biologically safen, physically stabilize, manage effluents, and recover resources from astronaut trash in the International Space Station (ISS). This process involves heating the trash to high temperatures, which in turn releases gaseous contaminants. Effluent management scenarios involve releasing these gases back to the ISS cabin after processing and/or directly venting these gases out to space via the Vacuum Exhaust System (VES). Concerns for recovering the gases back to cabin are crew health, safety, and spacecraft environmental impact. The Heat Melt Compactor (HMC) at NASA Ames Research Center (ARC) serves as a test system that supports TCPS development by conducting risk reduction activities associated with an ISS flight demonstration. Previous gas effluent studies were conducted on the HMC. The results consisted of contaminants from the trash exhaust to exceed Spacecraft Maximum Allowable Concentrations (SMAC), which are selected airborne contaminants that can elicit toxicity symptoms to crewmembers via exposure. The Source Contaminant Control System (SCCS) aims to reduce that risk by converting the contaminants into carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) vapor. The SCCS is composed of a carbon adsorbent bed, to avoid catalyst poisoning, and a catalytic oxidizer (CatOx), which promotes oxidation of the contaminants to CO<sub>2</sub> and H<sub>2</sub>O. In turn, the gases coming out of the SCCS should be compatible to the ISS cabin and systems such as the Trace Contaminant Control System (TCCS). Preparation for SCCS testing alongside the HMC Gen 3 are currently underway at ARC. The main objectives are to evaluate CatOx efficiency by CO<sub>2</sub> conversion and characterize effectiveness of removal by comparing contaminant results before and after CatOx. This paper will report on the SCCS design, operation, and testing with results.**

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<sup>1</sup> Chemical Engineer, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>2</sup> Engineer, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>3</sup> Solid Waste Management Lead, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>4</sup> Research Physical Scientist, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>5</sup> Solid Waste Management Advisor, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>6</sup> Science Payload Project Manager, Flight Systems Implementation Branch, M/S 240A-3, NASA ARC, Moffett Field, CA 94035.

<sup>7</sup> Senior Mechanical Engineer, Bioengineering Branch, M/S 239-15, NASA ARC, Moffett Field, CA 94035.

<sup>8</sup> Aerospace Engineer, Flight Systems Implementation Branch, M/S 240, NASA ARC, Moffett Field, CA 94035.

