Eliminate Active Thermal Systems

Space Propulsion Technology
Assessment Workshop

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Current Baseline
Eliminate Active Thermal Systems

- Current thermal management systems use one heat transport system but five fluids and three methods to get rid of the heat
  - Five fluids
    - Freon 21
    - Freon 114
    - Freon - FC40
    - Water
    - Ammonia
  - Three heat rejection mechanisms
    - Cargo bay door radiator
    - Water evaporator
    - Ammonia evaporator

Goal
Eliminate Active Thermal Systems

- The two evaporator systems and the five different fluids each require servicing, unplanned maintenance, and separate logistic trains

- Goal is to decrease the number of systems and fluids

Potential Solutions and Technologies to Implement Solutions (TRLs)
Eliminate Active Thermal Systems

- Use large heat sink available in propellant tanks (3)
  - Large amount only available for early part of mission
- Use hydrogen to cool fuel cells instead of freon (4)
  - Eliminate one fluid
- Use hydrogen tank bias to make open loop cooling (4)
  - Bias must be vented in a reusable system having a fuel tank (all Gen 2 and Gen 3 systems)
- Use radiator in landing gear door or some other vehicle surface (4)
  - Eliminate ammonia system
- Combine the freon systems or use hydrogen (4)
- Use water system instead of water and ammonia systems(4)
  - Compressor, flash evaporator, etc.

Cost to Mature Technology
Eliminate Active Thermal Systems