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# Propellants and Life Support SCAPE Suit and ECU Capability

National Space Symposium  
Colorado Springs, Colorado  
April 11- 14, 2011

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# National Space Symposium Purpose and Background



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## ◆ Purpose

- Demonstrate Propellant Handlers Ensemble (PHE) and Environmental Control Unit
- Promote effectiveness in protecting Propellant Technicians from IDLH environments related to propellant fueling operations
- Promote ISC Hypergol fueling support capabilities to Space Community
  - Actual fueling support
  - PHE – ECU Support to fueling operations by others

## ◆ Background

- 27<sup>th</sup> National Space Symposium – Colorado Springs (<http://www.nationalspacesymposium.org/>)
  - April 11-14, 2011
- Purpose
  - International Forum on the Space Industry
    - trends, advances, policy, technologies
  - Attendees include
    - NASA, NOAA, AF Space Command, NGA, Lockheed Martin, Raytheon, SpaceX, Northrop Grumman, Romanian Space Agency, Aerianespace (see NSS Attendees list: <http://www.nationalspacesymposium.org>)

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# National Space Symposium Demonstration



## ◆ Demonstration

- Propellant Handlers Ensemble (PHE) and Environmental Control Unit (ECU) technology and capability to be displayed at URS exhibit.



PHE with ECU



ECU

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# National Space Symposium Demonstration and Logistics



## ◆ Demonstration and Activity

- One PHE and ECU will be on display to solicit interest
- Each day 4/11-14/2011 URS Life Support Technician will suited in PHE with ECU and be fully self-contained from 1030 – 1130 and 1230-1330
  - A Life Support Supervisor and Engineer will be available to describe capability, solicit propellant loading work and answer questions.
  - There will be no technical documents available at the conference describing construction of either PHE or ECU

## ◆ Logistics

- Four Life Support Personnel are proposed
  - Two Technicians, Supervisor and Manager
- Three PHE and three ECU will be sent from KSC to NSS Conference Center
- One 160 Liter Liquid Breathing Air Dewar will be shipped from KSC to NSS Conference Center
- ECU Loading
  - Will be performed at the NSS Conference Center in loading area by Life Support Technicians
  - Life Support Technicians will perform suiting and serve as backup

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# National Space Symposium PHE/ECU Specifications



- ◆ The following information would be provided in support of describing PHE capability
  - Self contained atmospheric protective ensemble
    - Butyl covered Nomex
  - For use in propellant fueling, transfer operations, spill response.
  - Can operated in two modes
    - Mobile with ECU unattached to external air source
      - 2 hr capability
    - Attached to remote air source
      - > 2hr capability user dependent
  - Chemically resistant to Hydrazine (N<sub>2</sub>H<sub>4</sub>), MMH, UDMH and N<sub>2</sub>O<sub>4</sub>
  - Available in seven sizes, user specific – interchangeable boots and gloves
  - Specifications
    - 65 lbs (29.5 kg) with ECU
    - 22 lbs (10 kg) in airline mode
    - Positive internal pressure
  - Operating environment
    - + 20° F to +110° F
    - Humidity 20% to 95% relative humidity
    - Altitude sea level to 6500 feet (14.7 psia to 11.8 psia)



# National Space Symposium PHE/ECU Specifications



- ◆ The following information would be provided in support of describing Environmental Control Unit – ECU capability
  - Self contained portable life support system
  - Supplies
    - Conditioned breathing, ventilation, air conditioning, dehumidifying and suit pressurization to PHE
  - Construction
    - 8.5 liter liquid air Dewar, build-up coil, build-up valve, pressure regulating valve, two relief valves, vent valve, flow selector valve with low, medium and high flow rates, heat exchanger, ejector assembly, pressure indicator and outlet flex hose.
    - Dewar holds 15 lb cryogenic air
    - Cryogenic liquid air is -320 F
  - Operation
    - Vented air is warmed, expands and is distributed throughout the PHE
      - 60% flow distribution to the breathing zone
  - Specifications
    - Operational time: 2 hours
    - Total service weight fully charged: 41 lbs

**REPORT DOCUMENTATION PAGE**

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