Propellants and Life Support
SCAPE Suit and ECU Capability

National Space Symposium
Colorado Springs, Colorado
April 11-14, 2011
National Space Symposium Purpose and Background

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

- 27th 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, Arianespace (see NSS Attendees list: http://www.nationalspacesymposium.org)
National Space Symposium Demonstration

KSC Institutional Services Contract

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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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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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 (N2H4), MMH, UDMH and N2O4
  ➢ 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)
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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4. **TITLE AND SUBTITLE**
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12. **DISTRIBUTION/AVAILABILITY STATEMENT**
   Visual demonstration of SCAPE SUIT/Environmental Control Unit

13. **SUPPLEMENTARY NOTES**
   No technical information will be provided by presenters.

14. **ABSTRACT**
   Technicians will be wearing the SCAPE Suit / ECU to generate interest in commercial opportunities.

15. **SUBJECT TERMS**

16. **SECURITY CLASSIFICATION OF:**  
   a. REPORT  b. ABSTRACT  c. THIS PAGE

17. **LIMITATION OF ABSTRACT**

18. **NUMBER OF PAGES**

19a. **NAME OF RESPONSIBLE PERSON**
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