

# **National Personal Protection Technology Laboratory**

## **Concept for NIOSH Certification of Air-Fed Ensembles**

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# Defining an Air-Fed Ensemble

- The ensemble acts as the respirator
- ASTM defines an air-fed protective ensemble
- DOE STD 1167-2003 defines a supplied-air suit
- European (CEN) standard EN943 defines 4 types, 3 “gas-tight” and 1 “non-gas tight”
- ISO/DIS 16602.3 defines 5 types of chemical protective suits: “gas-tight”, “non-gas-tight”, “liquid-tight”, “spray-tight”, and chemical protective clothing providing protection against airborne solid chemicals

# Defining an Air-Fed Ensemble

- **ANSI defines 6 categories, similar to the ISO standard, with an additional partial body chemical protective and limited spray-tight clothing definition**
- **NIOSH reviewed all these standards and the draft NASA Certification Criteria and Test Results Document for the Propellant Handlers Ensemble (PHE)**

# Air-Fed Ensemble subpart to 42 CFR Part 84

- **Should the NIOSH development plan require the air-fed ensemble to be certified according to the respirator type used, i.e. supplied air respirator or air purifying respirator**
- **Some air-fed ensembles are made using powered air purifying respirators which are not certified for use in environments immediately dangerous to life and health (IDLH)**
- **Others use the ensembles in work environments that have good engineering controls in place, but could potentially become IDLH environments if those controls fail (draft SAR module requires escape canisters)**

## 42 CFR Part 84

- **Current subparts for air-purifying respirators (APR), supplied air respirators (SAR) and the ability to meet future technological advances and needs**
- **The NAS Report action planning process and response and its impact on the development plan for air-fed ensembles**

## **Air-Fed Ensemble subpart to 42 CFR Part 84**

- **The NIOSH Development Plan for the respiratory protection of Air-Fed Ensemble Standard includes creating a subpart to 42 CFR Part 84 to facilitate the ability to address a broader range of potential uses of the ensembles, as respirators, that may NOT be addressed by the existing subparts**

# NIOSH and ASTM

- **The CEN, ISO, DOE, ANSI and NASA standards were reviewed and the tests included were categorized as pertaining to respiratory protection for consideration of the NIOSH Development Plan for the Air-Fed Ensemble Standard**
- **The dermal protection provided by the ensembles would be addressed by the ASTM standard in development by committee F23**

# Common Test Requirements

- **All five reviewed standards included:**
  - **Inward Leakage Testing**
  - **CO<sub>2</sub> content in the inhalation air requirements**
  - **noise requirements**
  - **tests optimizing performance of the couplings, the air flow rate, the air supply source, and the external breathing hose**

# Tests common to 4 of the 5 standards

- There are an additional 15 test requirements that are common to 4 of the 5 Air-Fed suit standards or drafts of standards.

# Tests common to 4 of the 5 standards

- Air supply source and supply tube
- Breathing resistance and breathing tube
- Conditioning by wearing or temperature
- Connections, for cleaning and strength
- Continuous flow valve
- Internal breathing hose mechanical properties
- Pressure in the suit
- Resistance to ignition and flame
- Vision
- Warning and measuring means

# **NIOSH considering the following requirements for the concept**

- **Air-supply harness and system pressure**
- **Escape test, doffing**
- **Remaining service life indicator**
- **Test Temperature (s)**
- **Unmanned CO<sub>2</sub> in respired gas**
- **Weight requirement**

# Test Temperature and Preconditioning

- **A simple parameter that is addressed in the current standards, often specific to the user, DOE and NASA. The preconditioning requirement and test temperature may be a very significant parameter to consider since the components of the suits may be made from materials with widely varying thermal properties**
- **Polypropylene, polyvinylchloride, and silicone rubber, for example have significantly different temperature requirements.**

# Title 42 CFR Part 84

- **Subpart A: General Provisions**
- **Subpart B: Application for Approval**
- **Subpart D: Approval and Disapproval**
- **Subpart E: Classification of Approved Respirators**
- **Subpart G: General Construction and Performance**

# Potential Optional requirements

- **Service time and temperature**
- **Environmental Control Unit (ECU)**
- **Hand-operated valves**
- **Self donning and contaminated suit removal**
- **Flame and electrostatic charge resistance**
- **UV exposure, sterilization effects**

# Projected Timeline

- **May 2009 – Post Concept Requirements on NIOSH Web Site**
- **August 2009 – Public Meeting to discuss concept**
- **Mid 2010 – Initiate Rulemaking Processes**
- **Mid 2012 – Complete Rulemaking Processes**

# Input Sought from Stakeholders

- **NIOSH welcomes your comments about the Development Plan for Air-Fed Ensembles**
- **Information about suits currently produced, how they are used by workers now and in the future, and the methods used to evaluate their performance is needed**
- **Submit Comments Referencing NIOSH Docket 148**

# Docket Information

**Stakeholder Input can be submitted by**

– **Mail:**

**NIOSH Docket Office**

**Robert A. Taft Laboratories, M/S C 34**

**Reference: Docket 148 – Air-Fed Ensembles**

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