CBRN Standards Development

Why Develop New Respirator Standards (NIOSH Role)
- None Exist
- New Technology - Hazards
- New Technology - Applied to Respirators

Respirator Standards for Terrorism Agents
- Fit All 3 Criteria

Existing NIOSH or Military Standards are not completely applicable to meet a terrorism agent threat

Draft for Discussion
CBRN Standards Development Process

A. Hazard Analysis
B. Protectability
C. Human Factors / Environmental Factors
D. Concept Definition
E. Requirements
F. Test Procedures / Validation
G. Quality Assurance Requirements

Draft for Discussion
Development Process

- Being Conducted in Public Forum
- Meetings With Stakeholders (NFPA, IACP, FEMA, OSHA, CBIRF, CPSC, IAFF, IAFC, IAB, NIJ)
- Manufacturers
- Use of Website for Concept Papers

http://www.cdc.gov/niosh/npptl
CBRN APR Standard Goal & Target

Goal:

Develop a NIOSH NPPTL full facepiece air purifying respirator that addresses CBRN materials identified as inhalation hazards and/or possible terrorist hazards using a minimum number of filters for emergency responders.
<table>
<thead>
<tr>
<th>Target: Four (4) Filters</th>
<th>Long Duration</th>
<th>Short Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMs</td>
<td>60 Minutes</td>
<td>15 Minutes</td>
</tr>
<tr>
<td>TIMs plus CO</td>
<td>60 Minutes</td>
<td>15 Minutes</td>
</tr>
</tbody>
</table>
Hazards from Military High Threat Listing

Approximately 10 Respiratory Hazards

Category Grouping Address

NOSH, EN & MIL

Hazards List Derived From 3 Sources

Hazards, First Step
Use Conditions

A. Warm Use: Less than IDLH concentrations; sustained warm zone support operations; long term use for decon, traffic control, rehabilitation, rescue and recovery; hazard known & quantified.

B. Crisis Provision: Contingency use for short duration, above IDLH concentrations, high physiological (flow) demand. Contingency for unforeseen factors such as secondary device or pockets of entrapped hazard.
<table>
<thead>
<tr>
<th>Configuration</th>
<th>Filter #1</th>
<th>Filter #2</th>
<th>Filter #3</th>
<th>Filter #4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TIM’s less CO</td>
<td>TIM’s plus CO</td>
<td>TIM’s less CO</td>
<td>TIM’s plus CO</td>
</tr>
<tr>
<td>Long Duration Less Than IDLH</td>
<td>60 Minutes*</td>
<td>60 Minutes*</td>
<td>5 Minutes*</td>
<td>5 Minutes*</td>
</tr>
<tr>
<td>Crisis (Panic Demand)</td>
<td>5 Minutes*</td>
<td>5 Minutes*</td>
<td>15 Minutes*</td>
<td>15 Minutes*</td>
</tr>
</tbody>
</table>

* Indicated times are for illustration only. Actual times will be established from hazard modeling and developmental test results.
Interchangeability Concept

• Provision for Interchangeable Use of Consumable Filters
• Not Required but Requirements Identified
  – Optional for Manufacturers
• Considered Creative Alternatives Performance Based and Less Design Restrictive
  – Cumbersome to Implement in First Step Standard
• Utilize European Norms, EN 136 & EN 148
Draft Standard

Three Tier of Requirements

- 42 CFR, Part 84 – Applicable Sections
- Requirements Derived from other Standards/Specifications
- Special CBRN APR Requirements
Draft Standard – First Tier

- 42 CFR, Part 84
  1. 42 CFR, Part 84 Subparts A, B, D, E, F and G apply in total.
  
  These are:

  Subpart A: General Provisions
  Subpart B: Application for Approval
  Subpart D: Approval and Disapproval
  Subpart E: Quality Control
  Subpart F: Classification of Approved Respirators
  Subpart G: General Construction and Performance
Draft Standard – First Tier (continued)

2. 42 CFR. Part 84 Subpart I, the following paragraphs apply:
   - 84.110 Gas Masks: description
   - 84.111 Gas Masks: required components
   - 84.112 Canisters and cartridges in parallel: resistance requirements
   - 84.113 Canisters and cartridges: color and markings: requirements
   - 84.114 Filters used with canisters and cartridges: location; replacement
   - 84.115 Breathing tubes: minimum requirements
   - 84.116 Harnesses: installation and construction: minimum requirements
   - 84.117 Gas mask containers: minimum requirements
   - 84.118 Half mask facepieces, full facepieces, and mouthpieces: fit: minimum requirements
   - 84.119 Facepieces: eyepieces: minimum requirements
   - 84.120 Inhalation and exhalation valves: minimum requirements
   - 84.121 Head harnesses: minimum requirements
   - 84.123 Exhalation valve leakage test
Draft Standard – Second Tier

- Requirements Derived from other Standards/Specifications

**Human Factors / Environmental Factors Requirements:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facepiece Field of View</td>
<td>EN 136</td>
</tr>
<tr>
<td>Lens Abrasion</td>
<td>NFPA 1981</td>
</tr>
<tr>
<td>Communications</td>
<td>NFPA 1981</td>
</tr>
<tr>
<td>Hot Conditioning</td>
<td>Mil-Std-810 F</td>
</tr>
<tr>
<td>Cold Conditioning</td>
<td>Mil-Std-810 F</td>
</tr>
<tr>
<td>Humid Conditioning</td>
<td>Mil-Std-810 F</td>
</tr>
<tr>
<td>Vibration</td>
<td>Mil-Std-810 F</td>
</tr>
<tr>
<td>Drop</td>
<td>Mil-Std-810 F</td>
</tr>
<tr>
<td>Interchangeability</td>
<td>EN 136, EN 148</td>
</tr>
<tr>
<td>Breathing Resistance</td>
<td>42 CFR, Part 84</td>
</tr>
<tr>
<td>CO₂</td>
<td>42 CFR, Part 84</td>
</tr>
</tbody>
</table>
Draft Standard – Third Tier

• Special CBRN APR Requirements
  – Gas Life Testing
  – Systems CWA Penetration / Permeation
  – Laboratory Respiratory Protection Level
## Test Matrix for CBRN Air Purifying Respirators

<table>
<thead>
<tr>
<th>Test Order</th>
<th>Penetration and Permeation Testing</th>
<th>Particulate Testing</th>
<th>Service Life Testing, 64 lpm flow</th>
<th>Service Life Testing, high flow</th>
<th>42 CFR Testing</th>
<th>Drop (not order specific)</th>
<th>Human Factors (not order specific)</th>
<th>Interchangeability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6 APR systems (3 - GB and 3 - HD)</td>
<td>60 canister units</td>
<td>60 canister units</td>
<td>12 canister units</td>
<td>TBD APR systems</td>
<td>6 Canister Units (2 per test)</td>
<td>APR Systems --TBD --</td>
<td>APR Systems --TBD --</td>
</tr>
<tr>
<td>2.</td>
<td>Hot diurnal</td>
<td>Hot diurnal</td>
<td>Hot diurnal</td>
<td>Service Life Testing, 100 LPM</td>
<td>Canister in Parallel Resistance Requirements, 84.112</td>
<td>Major axis vertical, air inlet down</td>
<td>Hydration (3)</td>
<td>EN 136 &amp; EN 148</td>
</tr>
<tr>
<td>3.</td>
<td>Cold constant</td>
<td>Cold constant</td>
<td>Cold constant</td>
<td>Breathing Tube, 84.115</td>
<td>Major axis vertical, air inlet up</td>
<td>Optical Haze</td>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Humidity</td>
<td>Humidity</td>
<td>Humidity</td>
<td>Facepieces, eyepieces minimum requirements, 84.119</td>
<td>Major axis horizontal</td>
<td>Communications</td>
<td>Field of View</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Transportation vibration</td>
<td>Transportation vibration</td>
<td>Transportation vibration</td>
<td>Exhalation valve leakage test, 84.123 (2)</td>
<td>Determine CO₂ levels (4)</td>
<td>Communications</td>
<td>Field of View</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>System testing (GB or HD)</td>
<td>Initial breathing resistance, 84.122</td>
<td>Initial breathing resistance, 84.122</td>
<td>Service Life Testing, 64 LPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Final breathing resistance, 84.122</td>
<td>Final breathing resistance, 84.122</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Draft for Discussion
# Milestones for the CBRN APR Standards Development

**1. Gas Mask First Step:**
   - Concept Definition APR (Gas Mask)
   - APR Testing / Public Meeting
   - APR Detailed Standard Draft
   - Peer Review APR Standard
   - APR Standard Release

**2. APR Testing / Public Meeting**
   - April 15, 2002
   - June 30, 2002

**3. APR Detailed Standard Draft**
   - August 15, 2002
   - September 15, 2002

**4. APR Standard Release**
   - October 15, 2002

**5. Implement Certification APR Program**
   - December 31, 2002

*Draft for Discussion*
Milestones for the CBRN APR

Standards Development

2. Escape Sets (APR):
   1. Public Meeting
   2. Peer Reviews
   3. Standard Release
   4. Implementation of Certification

October 30, 2002
January 31, 2003
March 31, 2003
July 31, 2002

Draft for Discussion
Milestones For The CBRN Standards Development

3. PAPR's

1. Public Meeting: January 31, 2003
2. Peer Reviews: March 31, 2003

Draft for Discussion