National Personal Protective Technology Laboratory

Welcome and NPPTL Overview

Sheraton Station Square
Pittsburgh, PA
Les Boord

December 13, 2005
National Personal Protective Technology Laboratory

Continued Discussions of Concepts for Standards for Approval of Respirators for Use Against Chemical, Biological, Radiological and Nuclear Agents (CBRN) and Concepts for Standards for Industrial Powered Air Purifying Respirators

Review of PAPR Air Flow Measurement Technique Discussed at the July '05 Public Meeting

NIOSH-1 4/03
Breathing Machines

Variable

Fixed
National Personal Protective Technology Laboratory

Continued Discussions of Concepts for Standards for Approval of Respirators for Use Against Chemical, Biological, Radiological and Nuclear Agents (CBRN) and Concepts for Standards for Industrial Powered Air Purifying Respirators

Table 1—Performance requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂ concentration of dry breathing gas during inhalation</td>
<td>≤ 4% by volume</td>
</tr>
<tr>
<td>O₂ concentration of dry breathing gas during inhalation</td>
<td>≥ 15% by volume</td>
</tr>
<tr>
<td>Wet-bulb temperature of breathing gas during inhalation</td>
<td>≤ 50 °C</td>
</tr>
<tr>
<td>Maximum breathing gas pressure</td>
<td>≤ 200 mm, w.g.</td>
</tr>
<tr>
<td>Minimum breathing gas pressure</td>
<td>≥ 0 mm, w.g.</td>
</tr>
</tbody>
</table>

Table 2a—Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Work load</th>
<th>Work load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Ventilation rate, liters/min, at T lung, P local and 100% RH</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Respiratory frequency, breaths/min</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Oxygen consumption rate, liters/min,</td>
<td>3.2</td>
<td>1.35</td>
</tr>
<tr>
<td>Carbon dioxide production rate, liters/min,</td>
<td>3.4</td>
<td>1.15</td>
</tr>
</tbody>
</table>

*Volumes measured at Standard Temperature = 0 °C and Pressure Dry = 760 mm HG (STPD)*

NIOSH-1 4/03
### Table 2b—Protocol

<table>
<thead>
<tr>
<th>Rated duration as established by 42 CFR 84.100</th>
<th>Work load</th>
<th>Starting time (minutes)</th>
<th>Duration (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hour 1</td>
<td>A</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>12</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>55</td>
<td>5</td>
</tr>
<tr>
<td>Hour 2</td>
<td>A</td>
<td>85</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>90</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>115</td>
<td>5</td>
</tr>
<tr>
<td>Hour 3</td>
<td>A</td>
<td>145</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>Hour 4 and beyond</td>
<td>B</td>
<td>180</td>
<td>60</td>
</tr>
</tbody>
</table>

### Table 3—Environmental test conditions

<table>
<thead>
<tr>
<th>Environment</th>
<th>Temperature</th>
<th>Test duration</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold (EBM*)</td>
<td>EBM Temp ± 1°C (EBM Temp °F ± 2°F)</td>
<td>Cold soak for a minimum of 12 hours</td>
<td>Perform test at EBM Temp ± 1°C (EBM Temp °F ± 2°F)</td>
</tr>
<tr>
<td>Hot</td>
<td>71°C ± 1°C (160°F ± 2°F)</td>
<td>Hot soak for a minimum of 12 hours</td>
<td>Perform test at 71°C ± 5°C (160°F ± 10°F)</td>
</tr>
<tr>
<td>Cold temperature shock</td>
<td>71°C ± 1°C (160°F ± 2°F) transferred to EBM Temp ± 1°C (EBM Temp °F ± 2°F); Test temperature shall be EBM Temp ± 1°C (EBM Temp °F ± 2°F)</td>
<td>Hot soak for a minimum of 12 hours; initiate test within 3 minutes in cold chamber</td>
<td>Initiate test within 3 minutes after transferring apparatus to cold chamber</td>
</tr>
<tr>
<td>Hot temperature shock</td>
<td>EBM Temp ± 1°C (EBM Temp °F ± 2°F) transferred to 71°C ± 1°C (160°F ± 2°F); Test temperature shall be 71°C ± 5°C (160°F ± 10°F)</td>
<td>Cold soak for a minimum of 12 hours; initiate test within 3 minutes in hot chamber</td>
<td>Initiate test within 3 minutes after transferring apparatus to hot chamber</td>
</tr>
</tbody>
</table>

*EBM - The cold temperature operational limit shall be established by the manufacturer*
### Table 4—Simultaneous liquid and vapor challenge of SCBA with distilled sulfur mustard (HD)

<table>
<thead>
<tr>
<th>Agent</th>
<th>Challenge concentration</th>
<th>Duration of challenge (min)</th>
<th>Breathing machine airflow rate (L/min)</th>
<th>Maximum peak excursion (mg/m³)</th>
<th>Maximum breakthrough (concentration integrated over minimum service life (mg·min/m³))</th>
<th>Number of systems tested</th>
<th>Minimum service life (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD-Vapor</td>
<td>300 mg/m³ † †‡</td>
<td>30*</td>
<td>30 L/min (STPD) §§</td>
<td>0.60 ‡</td>
<td>6.0 §</td>
<td>3</td>
<td>† †‡</td>
</tr>
<tr>
<td>HD-Liquid</td>
<td>0.86 mL</td>
<td>Minimum service life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Vapor challenge generation will start immediately after the liquid drops have been applied and the test chamber has been sealed
† The test period begins upon the start of initial vapor generation
‡ Three consecutive sequential test data points at or exceeding 0.6 mg/m³ will collectively constitute a failure where each test value is based on a detector sample time of approximately 2 minutes
§ The cumulative CI, including all peak data points, must not be exceeded for the duration of the minimum service life
†‡ Minimum service life is equal to applicant's identified duration plus one hour
† †‡ Decay rate of vapor challenge will follow the same profile as the decay rate of the NIOSH CBRN Standard for an Open-Circuit SCBA
§§ Standard temperature 00°C and Pressure Dry 760 mm HG (STPD)

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### Table 5—Vapor challenge of SCBA with Sarin (GB)

<table>
<thead>
<tr>
<th>Agent</th>
<th>Challenge concentration</th>
<th>Duration of challenge (min)</th>
<th>Breathing machine airflow rate (L/min)</th>
<th>Maximum peak excursion (mg/m³)</th>
<th>Maximum breakthrough (concentration integrated over minimum service life (mg·min/m³))</th>
<th>Number of systems tested</th>
<th>Minimum service life (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB-Vapor</td>
<td>2,000 mg/m³ † †‡</td>
<td>30*</td>
<td>30 L/min (STPD) §§</td>
<td>0.087 ‡</td>
<td>2.1 §</td>
<td>3</td>
<td>† †‡</td>
</tr>
</tbody>
</table>

* The vapor challenge generation will be initiated immediately after test chamber has been sealed
† The test period begins upon initial generation of vapor concentration
‡ Three consecutive sequential test data points at or exceeding 0.087 mg/m³ will collectively constitute a failure where each test value is based on a detector sample time of approximately 2 minutes
§ The cumulative CI including all peak data points must not be exceeded for the duration of the Minimum Service Life
†‡ Minimum service life is equal to applicant's identified duration plus one hour
† †‡ Decay rate of vapor challenge will follow the same profile as the decay rate of the NIOSH CBRN Standard for an Open-Circuit SCBA
§§ Standard Temperature 00°C and Pressure Dry 760 mm HG (STPD)

NIOSH-1 4/03
National Institute for Occupational Safety and Health (NIOSH) / National Personal Protective Technology Laboratory (NPPTL)

CBRN Respirator Standards Public Meeting

December 13, 2005

Les Boord

NORA / NIOSH Program Sectors

• Agriculture, forestry, and fishing
• Construction
• Healthcare and social assistance
• Mining
• Manufacturing
• Services
• Transportation, warehousing, and utilities
• Wholesale and retail trade
NIOSH Cross-Sector Programs

- Authoritative Recommendations Development
- Cancer, reproductive, cardiovascular, neurologic & renal diseases
- Communications and information dissemination
- Emergency preparedness/response
- Global collaborations
- Health hazard evaluation (HHE)
- Hearing loss prevention
- Immune, dermal and infectious diseases
- Musculoskeletal disorders

**Personal protective technology**

- Radiation dose reconstruction
- Respiratory diseases
- Training grants
- Traumatic injury
- Work organization and stress-related disorders

NIOSH Coordinated Emphasis Areas

- Economics
- Exposure assessment
- Engineering controls
- Work life initiative
- Occupational health disparities
- Small business assistance and outreach
- Surveillance
### NORA Town Hall Meetings

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 5</td>
<td>College Park, Maryland</td>
<td>Transportation, Warehousing and Utilities</td>
</tr>
<tr>
<td>December 19</td>
<td>Chicago</td>
<td>Construction</td>
</tr>
<tr>
<td>January 17</td>
<td>Seattle</td>
<td>Agriculture, Forestry and Fishing</td>
</tr>
<tr>
<td>January 23</td>
<td>Houston</td>
<td>Healthcare &amp; Social Assistance</td>
</tr>
<tr>
<td>January 30</td>
<td>Jackson, Mississippi</td>
<td>Regional meeting</td>
</tr>
<tr>
<td>February 13</td>
<td>Tampa</td>
<td>Wholesale and Retail Trade</td>
</tr>
<tr>
<td>February 17</td>
<td>Iowa</td>
<td>Regional Meeting</td>
</tr>
<tr>
<td>February 21</td>
<td>Los Angeles</td>
<td>Public and Private Services</td>
</tr>
<tr>
<td>February 27</td>
<td>Salt Lake City</td>
<td>Mining</td>
</tr>
<tr>
<td>March 6</td>
<td>Troy, Ohio</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>March 13</td>
<td>Washington D.C.</td>
<td>Wrap-Up</td>
</tr>
</tbody>
</table>

### NIOSH

- Office of the Director, NIOSH
- Office of Extramural Programs
- Pittsburgh Research Laboratory (PRL)
- National Personal Protective Technology Laboratory (NPPTL)
- Division of Respiratory Disease Studies (DROS)
- Division of Safety Research (DSR)
- Health Effects Laboratory Division (HELD)
- Education and Information Division (EID)
- Division of Applied Research and Technology (DART)
- Division of Surveillance Hazard Evaluation and Field Studies (DSHEFS)
- Office of Compensation Analysis and Support (OCAS)
- Research to Practice (R2P)
- Spokane Research Laboratory
NPPTL Organizational Chart

- Associate Director for Science: M. D'Alessandro
- Deputy Director: Ken Williams
- Technology Evaluation Branch Chief: Heinz Ahlers
- Policy & Standards Branch Chief: Jon Szalajda
- Technology Research Branch Chief: Ron Shaffer
- Respiratory Protection PM: Roland Berryann
- Sensor Technology PM: George Bockosh
- Human Performance PM: John Kovac
- Ensemble PM: Bill Haskell
CBRN Respirator Certification

- CBRN SCBA: 41 approvals issued to 6 manufacturers
- CBRN SCBA Upgrade: 11 approvals (retrofit) issued to 2 manufacturers
- CBRN APR:
  - 6 approvals issued to 4 manufacturers
  - Additional approvals pending
- CBRN Escape:
  - 2 approvals issued to 2 manufacturers

Customer Relationships and Satisfaction

- National Academies Involvement in NPPTL
  - Committee on PPE for the Workforce (COPPE)
  - Review of Anthropometrics Survey and Respirator Panel Modifications
    - Next Meeting Feb 9, 2006 Irvine, CA
    - Review of BLS Survey of Respirator Use

- Customer surveys
  - Customer Satisfaction Survey (CSS)
  - Point of Service (POS) Surveys

- Customer Satisfaction Council
  - Council of 9 – 10 Customers
  - Council Coordinator: Tom Pouchot
  - Meet 3 times annually
  - First Meeting Spring 2006
Customer Service Dimensions and Outcomes

Service Dimensions
- Access
- Courtesy
- Knowledge
- Timeliness
- Reliability
- Choice
- Tangibles
- Recovery
- Quality of specific services

Organizational Outcomes
- Customer Loyalty
- Willingness to Recommend
- Organizational Effectiveness
- Perceived Value

Customer Satisfaction

Quality Partnerships Enhance Worker Safety & Health

Visit Us at: http://www.cdc.gov/niosh/npptl/default.html

Thank you