Laboratory Respirator Protection Level Testing (LRPL)

Alex G. Pappas
Mask Fit Test Facility Manager
SBCCOM
To evaluate respirator protective equipment (RPE) for military and civilian applications requiring protection against nuclear, biological and chemical (NBC) warfare agents
Chemical Stockpile Emergency Preparedness Program (CSEPP)
- Emergency responders

Chemical Agent Safety and Health Policy Action Committee (CASHPAC)
- Federal workers and contractors at U.S. Army research and storage facilities

Domestic Preparedness Program (Counter Terrorism)
- National, state, and local emergency responders

Technical Support Working Group (TSWG) on Counter Terrorism
- Federal law enforcement personnel
Relevant Test Standards and Protocols

- “Joint Service Standardization Agreement for Fit Factor Testing of Military Masks”, 1 Oct 91 (approved 8 Apr 92)
- “Protection Factor Testing of Respirators and Suit Ensembles”; Internal test protocol based on standardization agreement
• 29 CFR 1910.134
• AR 11-34
• AR 50-6
• AR 385-61
• DA PAM 385-61
• TB MED 502
• DA PAM 40-8
• ANSI Z88-2.1992
Each company would provide a minimum of 16 respirators (good quality) for testing. Providing fewer respirators for testing will increase costs.

Each company would submit donning and sizing instructions.
A minimum of 32 different data points will be generated from PF testing (statistically significant sample).

- Face length and face width will be measured (neck dam mask - neck circumference).

- Test subjects will be chosen based on anthropometrics.
Aerosol Challenge

- Corn oil
- Concentration of 20 to 40 mg/m$^3$
- Particle size of .4 to .6 microns (MMAD)
- The geometric standard deviation be less than 2.0
- Temperature 70F, Humidity 20%
Subject trained and fit for each respirator model (contractors can witness testing)

- Each subject will self-don prior to testing
- Joint Service standard ten-one minute exercise routine
- Oral-nasal sampling
- Sampling rate of 2 to 5 lpm.
LRPL Exercise Routine

- Normal Breathing
- Deep Breathing
- Turn head side to side
- Turn head up and down
- Recite the rainbow passage
- Climb stairs or sight rifle
- Reach for the floor or ceiling
- On hands and knees, turn head side to side
- Facial expressions
- Normal breathing
- Rear-light scattering photometers or equivalent
- Capable of measuring 100,000 PF
- Real-time measurement
Expression of performance based on the ratio of concentration outside the mask to concentration inside the mask, or

\[( \frac{C_o}{C_i} ) = PL \]

Example: 1000 ppm / 1.0 ppm = 1000

In other words, the air inside the mask is 1000 times cleaner than the outside air
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<th>Cumulative%</th>
<th>Pass Rate</th>
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