Respirators: Selection and Fit Assessment

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Utah State University
Objectives

* To be able to identify types of respiratory hazards
* To understand different health issues caused by hazards
* To be able to select the correct protection to prevent health issues caused by hazards
* To be able to correctly fit respiratory protection to ensure complete protection in hazardous atmospheric situations
Methods to protect respiratory health

- A respirator is **NOT** sufficient. Work practices that remove the hazard should be your **FIRST** line of defense.
  - Use a fork to spread out open bales rather than doing it manually.
  - Moisten the top layer of silage before opening it.
  - Lower the speed of equipment to reduce the release of fine particles.
  - Provide as much ventilation as possible when working in potentially hazardous conditions that may affect respiratory system.
Voluntary Respiratory Protection Program

* Choose the right respirator for the hazardous environment or task.

* Take certain precautions to be sure that the respirator itself does not present a hazard.

* Fit test if using tight-fitting respirators.

* You should do the following:
  * Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
  * Keep track of your respirator so that you do not mistakenly use someone else's respirator.
Types of Hazards

* Solid, Liquid, or Gas
  * Mold
  * Dust
  * Air Contaminants
  * Gases/Vapors
Effects of Air Contaminants the Respiratory System

* Gases and chemical can cause irritation of the cells lining the airways within the lungs. One of the body's basic responses to protect against this is to produce mucus. This mucus can make the airway opening smaller making it more difficult to breathe.
Effects of Air Contaminants on the Respiratory System

1. Acute exposure:
   - Acute exposure to air contaminants such as welding fumes can result in eye, nose, and throat irritation, fever, chills, headache, nausea, shortness of breath, muscle pain, and a metallic taste in the mouth.

2. Chronic exposure:
   - Chronic exposure can result in respiratory effects including coughing, wheezing, and decreased pulmonary function.
Health Aspects & Importance

* Farmer’s Lung
* Toxic Organic Dust Syndrome (TODS)
* Asthma

<table>
<thead>
<tr>
<th>Personal Protective Equipment (PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicators and other handlers (other than Mixers and Loaders) must wear:</td>
</tr>
<tr>
<td>• Long-sleeve shirt and long pants</td>
</tr>
<tr>
<td>• Shoes plus socks</td>
</tr>
<tr>
<td>• Protective eyewear</td>
</tr>
<tr>
<td>• Chemical Resistant Gloves - Category A (e.g. barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or Viton®)</td>
</tr>
<tr>
<td>• A dust mist NIOSH-approved respirator with any N, R, P, or HE filter</td>
</tr>
</tbody>
</table>

Mixers and Loaders must wear:

| Long-sleeve shirt and long pants |
| Shoes plus socks |
| A dust mist NIOSH-approved respirator with any N, R, P, or HE filter |
| Chemical Resistant Gloves - Category A (e.g. barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or Viton) |
| Chemical resistant apron |
| Face shield |

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product’s concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
When to Wear a Respirator

* Who needs respiratory protection? Those who:
  * work in dusty fields and buildings
  * handle moldy hay
  * work in silos
  * feed or work with feedstuffs
  * work in corn silage
  * uncap silos
  * clean grain bins
  * work in areas where bird droppings or dust from animal hair, feathers, or fur are present
  * work with fish meal
  * Mixing or applying agricultural chemicals (e.g. fertilizers, pesticides, fumigants)
  * work with toxic paints or solvents
  * work in areas where dust containing old paint, rust and wood particles
Types of Protection

* Two respirator categories:
  1. air purifying respirators (APR)
     * Particulate respirators
     * Particulate filtering facepiece respirators (aka N95s)
     * Elastomeric Respirators (full or half-face)
     * Powered air-purifying respirators (PAPRs)
     * “Gas Masks”
  2. Atmosphere-supplying respirators (ASR)
     * Airline respirators
     * self-contained breathing apparatus (SCBA)
Protection Types
Types of Protection

N = not oil resistant
R = Somewhat Oil resistant
P = Strongly Oil resistant

95 = 95%
99 = 99%
100 = 99.97%
Fit Assessment and User seal check

Fig. 8

Fig. 9

Fig. 10
User seal check

1. **Positive Pressure User Seal Check**
   - Close off exhalation valve with palm
   - Exhale gently
   - A small buildup of positive pressure, with no outward leaks, indicates a good face-piece fit
   - If air leakage is detected, reposition the respirator on the face, readjust the tension of the head bands, or try a different size respirator
   - Repeat the test until a satisfactory seal has been achieved

2. **Negative Pressure User Seal Check**
   - Cover air inlets with palms or other means; if a disposable, cover the entire filtering surface
   - Gently breathe in so that face-piece collapses slightly
   - Hold breath for 10 seconds
   - If respirator remains slightly collapsed and no inward leaks are felt, the face-piece fits tight enough. If air leakage is detected, reposition the respirator on the face, readjust the tension of the head bands, or try a different size respirator
   - Repeat the test until a satisfactory seal has been achieved
Facial Hair and Eyeglasses

![Image of a man with facial hair and eyeglasses]

### Accessories for the 7600 Series Full Facepiece

<table>
<thead>
<tr>
<th>Part#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>80100</td>
<td>Eyeglass frame. Plastic, no lenses</td>
</tr>
<tr>
<td>760023</td>
<td>Eyeglass frame. Metal, no lenses</td>
</tr>
<tr>
<td>760024</td>
<td>Eyeglass frame. Metal, no lenses</td>
</tr>
<tr>
<td>80836A</td>
<td>Peel-Away Windows (3 Windows per assembly)</td>
</tr>
<tr>
<td>78044</td>
<td>Anti-log Wipes</td>
</tr>
<tr>
<td>7684AG</td>
<td>Carrybag for Full Facepiece</td>
</tr>
</tbody>
</table>

![Diagram showing various styles of facial hair]

- dali
- fu manchu
- pencil mustaches
- imperial
- circle beard
- brett
- goatee
- soul patch
Selection Factors

- Nature of the hazard, and the physical and chemical properties of the air contaminant;
- Concentrations of contaminants;
- Relevant permissible exposure limit or other occupational exposure limit;
- Nature of the work operation or process;
- Time period the respirator is worn;
- Work activities and physical/psychological stress;
- Fit testing; and
- Physical characteristics, functional capabilities and limitations of respirators.
Resources

* CDC NIOSH: http://www.cdc.gov/niosh/npptl/
* Utah Asthma Task Force: www.health.utah.gov/asthma