Personal Protective Equipment:

Respirator Usage and Safety

During an animal health emergency, exposure to airborne hazards, such as zoonotic disease agents or chemicals, may occur. A number of different respirators are available and when used correctly can provide various levels of protection.

Respirators

- A personal protective device worn on the face. It covers the nose and mouth and is specifically designed to provide respiratory protection by forming a tight seal against the wearer's skin.
- Respirators vary in their level of protection and efficiency to filter out airborne particles such as dust, pathogens, gases, or vapors, or chemical splash.

Classification of Respirators

- **Air-Purifying Respirators**
  - Removes contaminants from the air
  - Particulate respirators
    - **Particulate Filtering Facepiece (N95s)**
    - **Elastomeric Respirators**
    - **Powered Air-Purifying Respirators (PAPRs**)
  - "Gas mask" respirators
- **Air-Supplying Respirators**
  - Provides clean source of air
    - **Supplied air respirators (SAR)**
    - **Self-contained breathing apparatus (SCBA)**
- OSHA Videos on Respirator Types
  - https://www.osha.gov/video/respiratory_protection/resptypes.html

NIOSH Particulate Filter Categories

Minimum Filter Efficiency	**N series** Not resistant to oil	**R Series** Somewhat resistant to oil	**P Series** Strongly resistant to oil
95%	N95	R95	P95
99%	N99	R99	P99
100% (99.97%)	N100	R100	P100 (~HEPA)

Selecting a Respirator

- **Type of hazards**
  - Particulate vs. gasses or vapors
- **Identity and concentration of the contaminant**
- **Level of protection provided by respirator**
- **Activity of the person wearing the respirator**

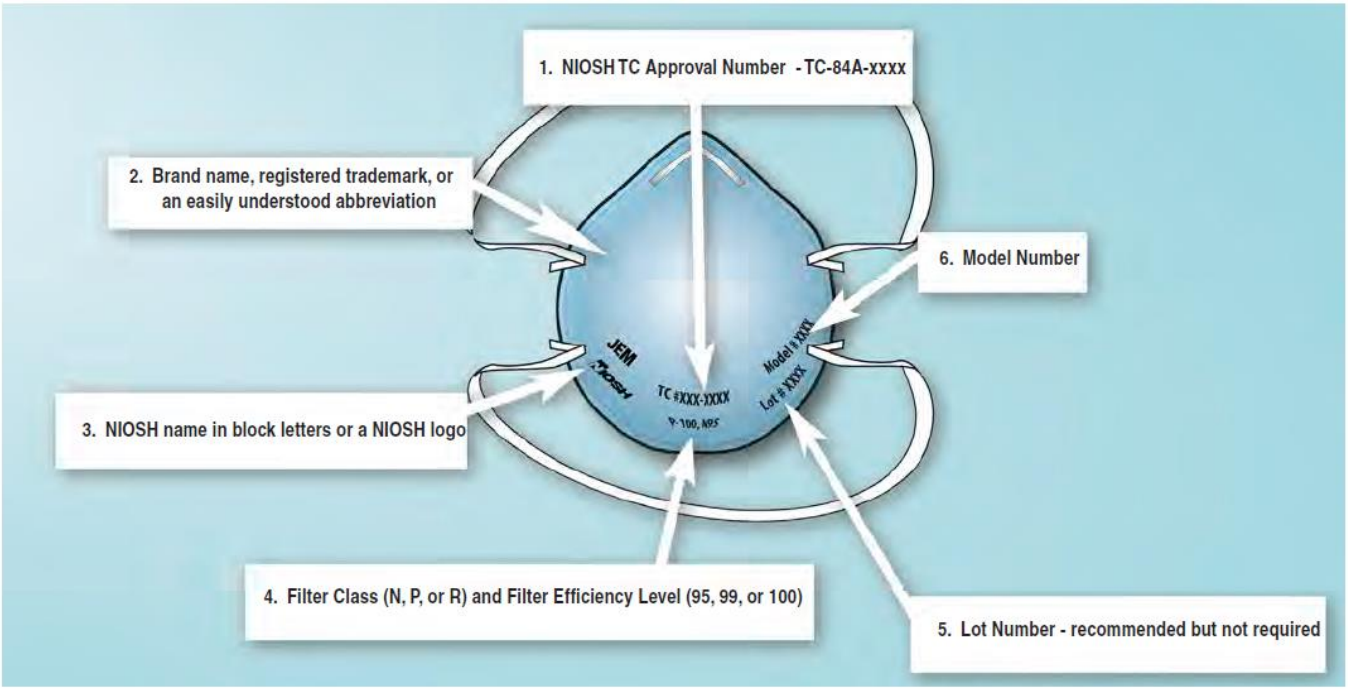
Standards and Regulations

- **OSHA -Occupational Safety and Health Administration**
  - 29 Code of Federal Regulations. Part 1910 – Occupational Safety and Health Standards
  - Part 1910.134: Respiratory Protection
  - http://www.osha.gov
- **NIOSH - National Institute for Occupational Safety and Health**
  - http://KnowIts.NIOSH.gov

Proper Use of Respirators

- **Fit-testing**
  - To determine the make, model, and size of respirator that fits; uses qualitative or quantitative check
  - Video about fit testing https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html
- **Seal check**
  - To ensure adequate seal is achieved each time the respirator is put on; uses positive and negative pressure checks
  - Video about seal checking http://www.youtube.com/watch?v=Tzpz5fko-fg
- **Training**
  - Proper donning and doffing
  - Video about training requirements https://www.osha.gov/video/respiratory_protection/training.html
- **Medical evaluation**
  - Personal health questions and medications
  - Work conditions
  - Video about medical evaluations https://www.osha.gov/video/respiratory_protection/medevaluations.html

Example of Exterior Markings on a NIOSH-Approved Filtering Facepiece Respirator



Source: NIOSH Respirator Awareness: Your Health May Depend On It at http://www.cdc.gov/niosh/docs/2013-138/pdfs/2013-138.pdf

Exterior Markings of NIOSH-Approved Filtering Facepiece Respirators (diagram)

1. **NIOSH TC** (Testing and Certification) Approval Number. Here the example is TC-84A-xxxx. All NIOSH approval numbers begin with the letters TC.
2. **Brand name, registered trademark**, or an easily understood abbreviation
3. **NIOSH name** in block letters or a NIOSH logo
4. **Filter Class** (N, P, or R) and Filter Efficiency Level (95, 99, or 100)
5. **Lot Number** - recommended but not required
6. **Model Number**

Health Effects When Wearing Respirators

- Increased resistance to breathing
- Reduced endurance
- Reduced visual field
- Increased risk for heat stress
- Decreased voice clarity/loudness
- Decreased hearing ability
- Discomfort or irritation
- Psychological stress

Safe Respirator Usage

- **Do not use a respirator unless formally trained and fit tested**
- **Select the correct respirator for the job**
  - Particulate filter will not protect against gases/vapors
- **Inspect the respirator before each use**
- **Ensure the face seal**
  - Shave any facial hair
  - Prevent hair or eyeglasses from interfering
- **Do not wear contact lenses with a respirator**

Before Usage

- **Inspect all parts of the respirator before use**
  - The facepiece, head straps, valves, tubes, hoses, and any cartridges, canisters or filters
  - Check parts for pliability or deterioration
- **Check that batteries are charged**
- **Ensure proper air flow**
- **Do NOT use the respirator if it is not working properly!**

During Usage

- **Immediately leave contaminated area if the respirator stops working**
- **Immediately leave contaminated area if you feel nauseous, dizzy or ill, or have difficulty breathing**
  - Return to fresh air and remove the respirator
  - Never remove a respirator in contaminated area
- **Once in a safe area, check if the canister, cartridge, or filter**
  - Replace if user notices an odor, taste, or throat irritation
  - Replace any wet, damaged, and grossly contaminated cartridges/canisters
- **If using battery operated respirators (PAPRs),**
  - Do not work in contaminated conditions longer than the battery will last
  - Check the battery periodically to make sure enough power is left to finish the job
  - If not, stop and get a fully charged battery from a safe area.
- **If using SCBA respirators,**
  - Only work as long as the air supply will last
  - Do not try to test the limit
  - When the air supply is getting low, return to a safe area for a full tank

Cleaning

- **Follow manufacturer's cleaning guidelines**
- **Warm water/mild detergent**
- **Disinfectant solution**
- **Rinse thoroughly**
- **Dry thoroughly**
- **Never soak entire unit in detergent**
- **Do not use solvents**

Respirator Storage

- **Store in accordance with manufacturer's instructions**
- **Check expiration dates**
- **Never use and discard if:**
  - Color changes
  - Shrinking
  - Wearing/thinning of material
  - Stretching
  - Cuts/tears/holes

Additional Resources

- National Institute for Occupational Safety and Health (NIOSH) – Respirators
  http://www.cdc.gov/niosh/topics/respirators/
- Occupational Safety and Health Administration (OSHA) – Respiratory Protection
  https://www.osha.gov/SLTC/respiratoryprotection/
- OSHA Respirator Training Videos
  https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html#video
- U.S. Food and Drug Administration (FDA) – Masks and N95 Respirators
  http://www.fda.gov/medicaldevices/productsandmedicalprocedures/generalhospitaldevicesandsupplies/personalprotectiveequipment/ucm055977.htm
- U.S. Department of Agriculture – Foreign Animal Disease Preparedness and Response Plan (FAD PReP) NAHEMS Guidelines: Personal Protective Equipment
  http://www.aphis.usda.gov/animal_health/emergency_management/downloads/nahems_guidelines/fadprep_nahems_guidelines_ppe_final_april2011.pdf

Development of this educational material was by the Center for Food Security and Public Health at Iowa State University through funding from the Multi-State Partnership for Security in Agriculture MOU-2014-HSEMD-002. June 2014. Revised July 2014.