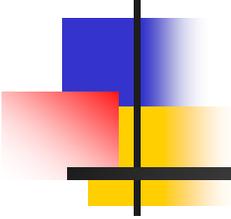


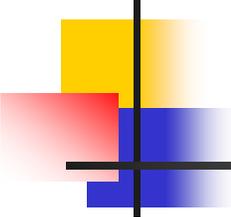
# Respiratory Protection from Airborne Infectious Agents



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Use of N-95, N-99 and N-100  
Disposable Particulate Respirators  
in Emergency Medical Services

**Public Employees Occupational Safety and Health Program  
New Jersey Department of Health and Senior Services, 2006**



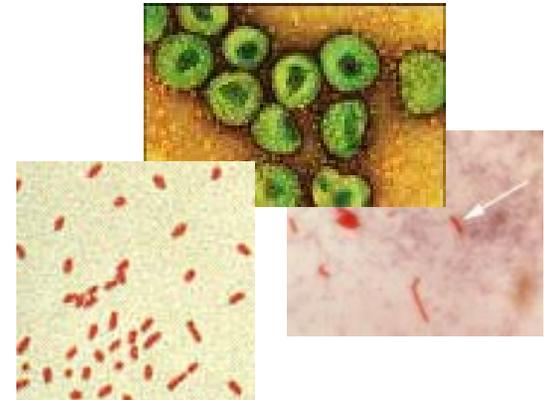
# Objectives

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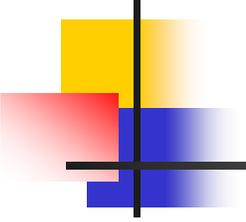
- Explain what N-95 disposable particulate respirators are and why they are necessary
- Discuss their capabilities and limitations.
- Demonstrate proper use.
- Review the requirements of the respiratory protection program.

# Why is an N-95 disposable particulate respirator necessary?

For personal protection from airborne pathogens like Tuberculosis, SARS, Chickenpox, Measles and Smallpox.



It protects by filtering out infectious particles from the air you breathe.

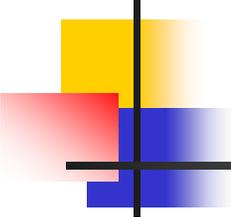


## Why is an N-95 disposable particulate respirator necessary?

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If a respiratory disease outbreak or an intentional biological event occurs, EMS personnel, public safety officers and local public health workers will be on the front lines and need ready protection.

N-95 disposable particulate respirators are the minimum level of protection needed for airborne infectious agents.



NJ Department of Health & Senior Services  
Memo to the EMS Community, March 2005

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*“N-95 respirators should be worn when responding to patients with unknown, potentially infectious respiratory or influenza-like illness.....and.... when caring for patients with diagnosed infectious illnesses such as tuberculosis.....”*

*Properly fitted, N-95 respirators should protect the worker against bioterrorism and non-bioterrorism related respiratory pathogens.”*

Eddy Bresnitz, MD, MS, Deputy Commissioner/State Epidemiologist  
<http://www.state.nj.us/health/ems/documents/n95.pdf>

# What are N-95 disposable particulate respirators?



# N-95's reduce exposure to particles that are small enough to be inhaled

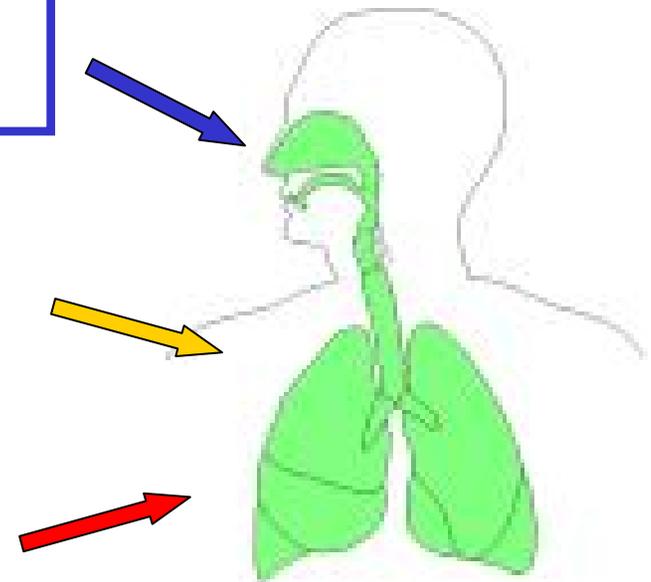
## Micron sizes of some pathogen groups

Fungi	2-200
Mold spores	1-70
Bacteria	0.5-10
Viruses	0.02-0.3

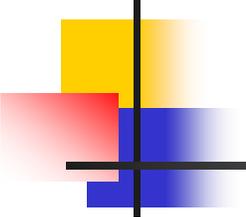
Particles < 100 microns can be inhaled through nose and mouth

1-5 micron particles can enter upper airways

0.1 – 1 micron particles can enter lower lungs and alveoli



**[ N-95 filters are tested on particles greater than 0.3 microns in size. ]**



# What does “N-95” mean?

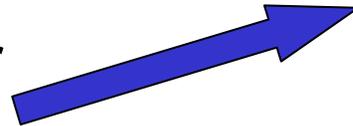
An N-series filter that is at least 95% efficient in removing particles greater than 0.3 microns in diameter.

- **Named by NIOSH, the agency that approves respirators**
- **N-95s used to protect workers must be NIOSH-approved**
- **Belongs to a class of respirators called filtering facepieces**
- **9 filter classes ranging from 95-99.97% efficient**
- **Over 300 different models of N-95 respirators approved**

[http://www.cdc.gov/niosh/npptl/topics/respirators/disp\\_part/n95list1.html](http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/n95list1.html)

# How can you tell if a respirator is NIOSH-approved?

NIOSH approval number  
on respirator:



**84A-####**

Approval label in box



NIOSH Certified Equipment List  
Website



SAMPLE

DOUBLE WING MANUFACTURING COMPANY  
ST. XAVIER, ALMOST HEAVEN, USA  
1-800-123-4567



THESE RESPIRATORS ARE APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS:

TC	PROTECTION <sup>1</sup>	RESPIRATOR	CAUTIONS AND LIMITATIONS <sup>2</sup>
84A-00X	N95	HALO 2000	A B C J M N O

**1. PROTECTION**

N95-Particulate Filter (95% filter efficiency level) effective against particulate aerosols free of oil; time use restrictions may apply.

**2. CAUTIONS AND LIMITATIONS**

A- Not for use in atmospheres containing less than 19.5 percent oxygen.  
B- Not for use in atmospheres immediately dangerous to life or health.  
C- Do not exceed maximum use concentrations established by regulatory standards.  
J- Failure to properly use and maintain this product could result in injury or death.  
M- All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.  
N- Never substitute, modify, add, or omit parts. Use exact replacement parts in the configuration as specified by the manufacturer.  
O- Refer to users instructions, and/or maintenance manuals for information on use and maintenance of these respirators.

[http://www.cdc.gov/niosh/npptl/topics/respirators/disp\\_part/n95list1.html](http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/n95list1.html)

Is an N-95 disposable respirator  
the same as a surgical mask?

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**NO !!**



**A surgical mask is not a respirator.**

***It is NOT NIOSH-approved.***

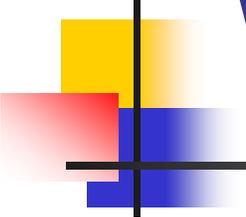
# Is an N-95 disposable respirator the same as a surgical mask?

A surgical mask does not provide adequate protection for EMS responders....



HOWEVER.....

A surgical mask MAY be placed on the patient to limit spread of respiratory secretions.



## What N-95 respirator is being issued?

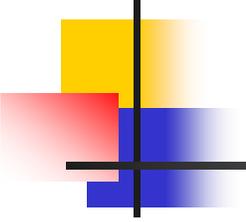
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This EMS agency uses the following brand(s) and model(s) of N-95 disposable particulate respirators:

#1 \_\_\_\_\_

#2 \_\_\_\_\_

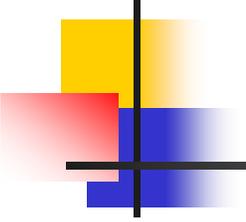
#3 \_\_\_\_\_



# Advantages of N-95 disposable particulate respirators

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- Lightweight
- Fairly comfortable to wear
- Don't restrict mobility
- Disposable
- Low cost
- Require no cleaning or maintenance

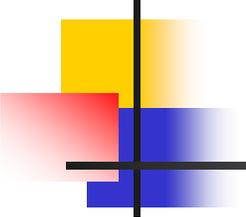


# Limitations of N-95 disposable particulate respirators

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## ***They DON'T protect from:***

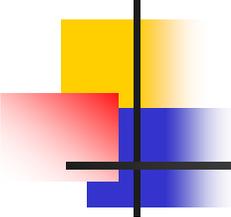
- Oxygen deficiency
- Harmful chemical gases and vapors
- Skin or eye contact with pathogens
- High concentrations of pathogens



# What do these limitations mean for EMS activities?

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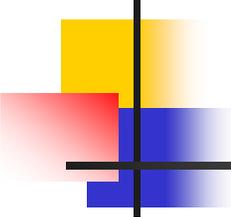
- Don't enter an oxygen deficient atmosphere while wearing an N-95 disposable particulate respirator. It does not supply air.
- Don't use an N-95 disposable particulate respirator for protection from chemical hazards; it does not have the capacity to filter chemical gases and vapors; it only filters particles.
- If the airborne infectious agent is also spread by skin or mucous membrane contact (such as SARS), use goggles, gloves and gown.
- If an intentional biological event has occurred, higher levels of respiratory protection may be required. Work within the incident command structure to obtain proper instructions about respiratory protection.
- N-95 disposable particulate respirators must be worn the entire time the wearer is in the contaminated area or in close proximity to potentially infectious persons.



If N-95 disposable particulate respirators are issued, EMS agencies must comply with the PEOSH Respiratory Protection Standard

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1. Written respiratory protection program with an assigned program administrator
2. Proper selection of respirators
3. Training about the hazards and proper use
4. Medical clearance (initially and if there are changes)
5. Fit testing (annually)
6. Evaluation of program effectiveness (annually)

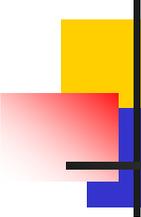


# Proper Use of Your Brand and Model of Respirator

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OBTAIN AND REVIEW  
THE MANUFACTURER'S INSTRUCTIONS FOR:

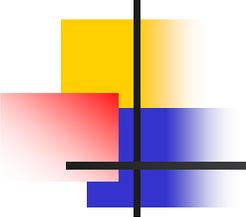
- ✓ Proper donning
- ✓ Seal check
- ✓ Removal
- ✓ Reuse



# General Seal Check Procedures for N-95 Disposable Respirators

Whenever the respirator is donned:

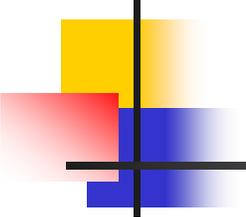
1. Place one or both hands completely over the filtering facepiece.
2. *Inhale and exhale sharply.* If air leaks around your nose, readjust the nosepiece. If air leaks between the face and face seal of the respirator, reposition it by adjusting the panels and straps.
3. If you cannot achieve a proper seal, **do not** enter the contaminated area. See your respiratory program administrator.



# Proper Use

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- No facial hair that interferes with face to facepiece seal
- If shape of the N-95 is compromised, it may not fit properly
- If respirator becomes damaged, soiled or if breathing becomes difficult, leave the contaminated area and replace the respirator
- If used in caring for patient with a disease spread through contact, dispose of N-95 after each use.



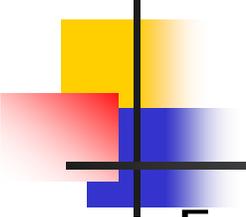
# The question about respirators and beards

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Anything that prevents the face mask from fitting tightly against the face, such as a beard, goatee or long sideburns, may cause leakage.

No facial hair or even stubble should interfere with the face-to-facepiece seal or valve function.

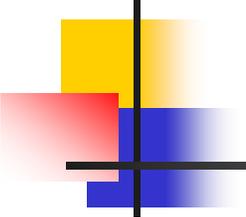
The PEOSH standard assigns employers the responsibility for monitoring proper respirator use by their employees or volunteers.



# Medical Evaluation

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- Even though N-95's are lightweight and non-restrictive, they require medical evaluation and clearance before use.
- The medical evaluation must take place prior to initial use and later, if there are symptoms related to respirator use.
- The medical evaluation entails a confidential respiratory questionnaire and/or in-person medical evaluation.
- Written clearance form should only tell employer if the EMS responder can or cannot wear a specific respirator – no confidential information should be included.
- Medical provider keeps questionnaire in confidential file.

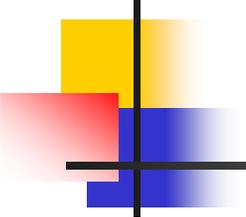


# Fit-Testing

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If a respirator does not make a tight seal around the face during inhalation, contaminated air may leak around the edges of the face seal. The only way to tell if a respirator fits and is capable of protecting properly is to fit-test the respirator.

PEOSH requires fit-testing prior to initial use  
and annually thereafter.



# Fit-Testing

The fit-test can be qualitative or quantitative and must follow one of the PEOSH-approved protocols described in the Respiratory Protection Standard.

Identify the fit-test protocol used in this EMS agency:

- Quantitative fit-test using Portacount computer
- Qualitative fit-test with Bitrex
- Qualitative fit-test with Saccharin

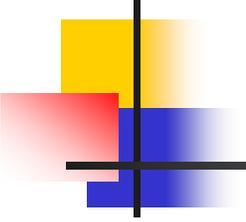
# Quantitative vs. Qualitative Fit-Testing



**Quantitative:**  
Computerized means  
of detecting faceseal  
leakage



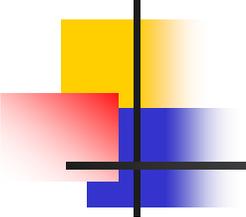
**Qualitative:**  
Relies on wearer's  
subjective response to  
taste, odor or irritation



# If there are problems..... make changes

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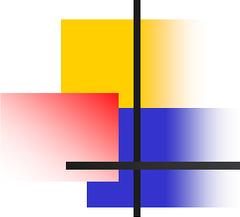
- periodic program evaluation required –  
PEOSH recommends annual evaluation
- responsibility of program administrator



# Escape-Only Respirators

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- Only one part of an emergency plan
- Designed to be used ONLY in an emergency
- ONLY PURPOSE: escape from a dangerous area to a safe area
- NOT to be used to enter a contaminated area

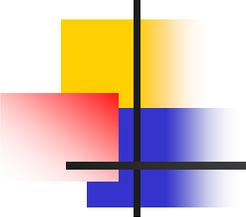


THEREFORE.....

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*IN ORDER TO USE THE ESCAPE  
RESPIRATOR AS INTENDED.....*

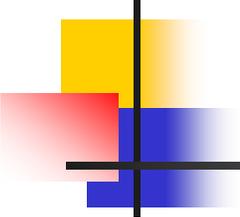
*.....YOU MUST HAVE THE  
RESPIRATOR WITH YOU !!!!!*



# Escape-only respirators

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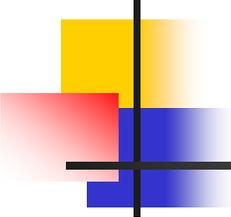
- **Designed for one-time use for a short period**
- **May not protect from all chemicals or infectious particles**
- **Wearer needs to know:**
  - **Does it supply oxygen?????**
  - **Does it filter particulates?**
  - **Does it protect against toxic gases? Which ones?**
  - **How long will the filters work?**
- **Most escape respirators NOT NIOSH-approved**



# Escape-Only Respirators

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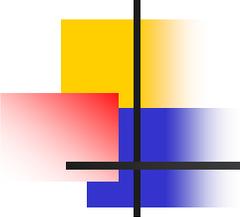
When exposures of EMS personnel to specific respiratory hazards can be anticipated, PEOSH recommends that a NIOSH-approved respirator capable of protecting responders from the specific hazard be issued.



# Respiratory protection is effective only if:

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- The correct respirator is used
- It's available when you need it
- You know when and how to put in on and take it off
- You have stored it and kept in in working order in accordance with the manufacturer's instructions



NJ Department of Health & Senior Services  
PEOSH Program

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609-984-1863

<http://www.state.nj.us/health/eoh/peoshweb>