Facilitator's Guide:

SELECTING PERSONAL PROTECTIVE EQUIPMENT (PPE) And Air Purifying Respirator

Objectives:

Select the proper PPE to protect from mold.
Recognize respiratory protective equipment
Explain the need to wear respiratory protection
Explain how to clean and store an Air Purify Respirator (APR)
Demonstrate proper use of APR by correctly:
- **Inspecting and appropriate APR**
- **Donning the APR**
- **Doffing APR**
- **Performing user seal check**

Explain what a Qualitative Fit Test (QLFT) and Quantitative Fit Test (QNFT) are.
Limitations of an APR

Start out by explaining: **(5 minutes)**

There currently are no exposure standards or health effects threshold exposure levels against which to base unsafe exposures. Sampling is expensive, time consuming, and difficult to apply when dealing with mold.

Researchers strongly recommend personal protection of both the respiratory system and eyes for workers and isolating the work to protect occupants and fellow workers.

Factors affecting Mold Exposure Potential Are:

Project size, square footage of mold that is present
Type of dust control
Amount of potential release
Amount of mold work time per day
The size of the mold

Introduction (25 minutes)

ASK: What are some examples of PPE?

List on the flip chart all types of PPE participants suggest.

Examples: gloves, boots, encapsulating suits, respirators, hard hats, ear plugs, eye goggles/safety glasses, safety shoes with steel toe and/or metatarsal protection, gowns, face shields, etc.

ASK: What do you need to know before selecting PPE?

- Identify the material and or physical hazards
- Routes of entry (inhalation, absorption, ingestion and contact
- Concentration of the material (how much)
- Oxygen content in the atmosphere (must be 19.5% for APR's)
- What form is the material in (gases, vapors, solids or liquids)
- Location of involved area (indoors, outdoors, enclosed, well ventilated)
- Environmental conditions (hot, cold, windy, rainy)

ASK: What are some Limitations of PPE

- Does not solve the problem
- Requires proper selection and use
- Requires proper training
- PPE must be adequately stocked and properly distributed
- Uncomfortable
- Hot (temperature)
- May restrict visibility, movement, and communication
- Costly

Explain that mold work is generally classified as:

Maintenance: **work that tends to be low-level exposure and involves small areas of mold contamination and is classified as Level 1 or Level 2.**

Remediation Work: **work that is often seen as a higher level of exposure and usually employs more training and is classified as Levels 3 thru 5**

These classifications are from the NYCDOH, 2000 guidelines and are recognized and used by OSHA

ASK: What do you thing the level classifications are?

Write on flip chart:

- Level I: small isolated areas of 10 sq. or less*
- Level II: mid-sized isolated areas between 10 and 30 sq. ft.*
- Level III: large isolated area of 30 – 100 sq. ft.
- Level IV: extensive contamination of greater than 100 contiguous sq. ft.
- Level V: HVAC systems
  - Small isolated area of contamination of less than 10 sq. ft.
  - Area of contamination greater than 10 sq. ft.

Noted as appropriate for regular building maintenance staff to perform.

(FYI if asked about the classifications)

These mold work level categories have been widely recognized and used. OSHA's brief guide to mold in the workplace (OSHA, 2003) employs the level I through IV categories generally as stated in the NYC Guide. Level V, HVAC systems, is not included except with a recommendation to consult NADCA or an EPA guide. Level I and II are stated as being appropriate for performance by building maintenance staff, as in the NYC guide.

EPA's Mold Remediation in Schools and Public Buildings (EPA, 2001) includes three levels of remediation of "mold growth caused by clean water"

Small: **less than 10 sq. ft.**
Medium: **10 -100 sq. ft.**
Large: **greater than 100 sq. ft.**

Show two suites and ask: what are the differences between the two?

Show different gloves

On flip chart write the following and then ask: what is degradation, penetration,

and permeation?

Degradation: This is the breakdown of a protective material when it comes in contact with a chemical causing it to change weight by things such as swelling, stiffening, or becoming brittle. Also, other things can cause material to degrade such as ultraviolet light, moisture, and humidity.

Penetration: This is chemicals passing through zippers, seams, or other such design limitations, pinholes, or imperfections.
While demonstrating a CPC suit, point out to the class where chemicals can enter through zippers, seams, etc.. Also reinforce that suits are only as strong as their weakest link and that most face shields are not tested for chemical resistance.

Permeation: This is chemicals passing through a material on a molecular level like helium passing through a rubber balloon over time.

Discuss **breakthrough** which refers to the time for the first measurable amount of a chemical to go through the protective material.

Distribute manufacturer's glove/suit selection guides and go over how to read them

To find out breakthrough times and degradation ratings for a particular glove/suit, one must go to that manufacturer's selection guide. Stress that not all CPC is created equal - breakthrough times and degradation ratings may differ so you can't use Manufacturer X's glove selection guide for Manufacturer Y's glove. Permeation data should be available upon request.

CAUTION! Make sure that the glove being used in the workplace is the same thickness as the material that was tested since some manufacturers make several thicknesses of gloves.

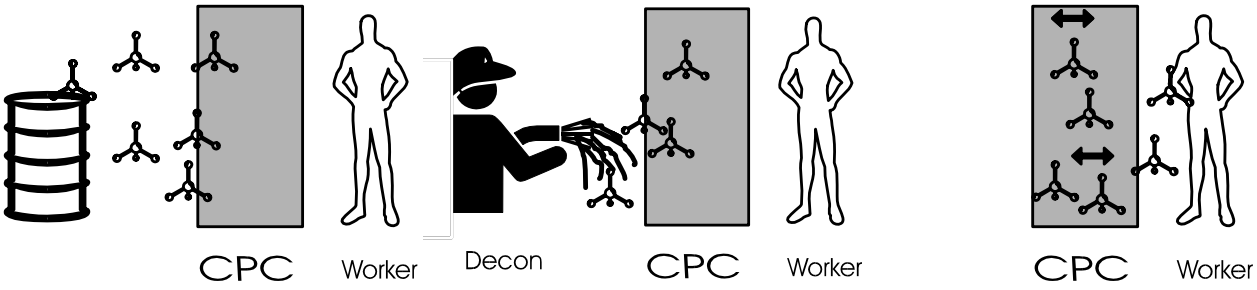
Decontamination: (5 minutes)

What is the purpose of decontamination?

Just to remove the gross contamination so the worker can safely remove CPC without cross-contamination

Do we want to clean PPE for re-use?

No - most PPE are limited use
There is substantial evidence that shows how molecules of a chemical can continue going through the material even after decon.



What things cannot be decontaminated and must be thrown away if contaminated?

wood, cotton, wool, bunker gear, leather, any absorbent material

Summarize

It is important to know about the job and level before choosing personal protective equipment. When using the considerations and limitations given earlier and manufacturers glove selection charts, you can know if you have the appropriate personal protective equipment for the task and level.

Facilitator's Study Guide to

Air-Purifying Respirators

Introduction: (45 minutes)

In January 1998, OSHA published their new respiratory protection regulations which became final on October 5, 1998. The previous respirator standard was almost 30 years old. The new standard is much more specific on elements of a respiratory protection program in areas such as medical evaluations and fit-testing protocol. We will be discussing elements of this new respiratory standard as part of this overview of respiratory protection.

Begin module by asking questions such as:

- Who wears respirators?
- What type?
- How were they selected?
- Have you been fit tested?
- How was it done?

(While asking these questions you should hold up and show different type respirators)

Elements of a minimally acceptable respirator program

Since you just referred to the Respiratory Protection Standard, quickly go over these elements as listed in this order in 1910.134(c)(1)(i-ix).

NOTE: Again, the purpose of this module is respirators so don't get off on a long discussion on any of these topics.

- Written **standard operating procedures** for selection and use of respirators [1910.134(c)(1)(i)]

- Those who wear respirators must have an initial **medical evaluation** [1910.134(c)(1)(ii)]

- Workers must be **fit tested** for tight-fitting respirators [1910.134(c)(1)(iii)]

- There must be procedures for **proper use of respirators in routine and "reasonably" foreseeable emergency situations** [1910.134(c)(1)(iv)]

- There must be procedures and schedules for **cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining** respirators. [1910.134(c)(1)(v)]

- Procedures to **ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators** (this means the air for Self Contained Breathing Apparatuses - SCBAs - and airline respirators) [1910.134(c)(1)(vi)]

- Workers must be **trained in the respiratory hazards to which they are potentially exposed during routine and emergency situations**. So it is not enough to know just how to properly wear a respirator, you have to know **why** you possibly have to wear one; what is the hazard? [1910.134(c)(1)(vii)]

- Workers must be **trained in proper use** and limitations of respirators. This includes putting them on, removing them, and any maintenance they must do. [1910.134(c)(1)(viii)]

- Respirator **program must be regularly evaluated** for effectiveness [1910.134(c)(1)(ix)]

The federal agency who **approves respirators** is **NIOSH**. Previously all approved respirators had a TC (Testing Certification) number on them. But this TC designation is no longer being used though you may still continue to see it out in the workplace for some time. Current approvals omitted the TC number and substituted other information such as the word "NIOSH" and the chemical class for which protection is being provided. NIOSH-certified respirators are required under the Respiratory Protection Standard [1910.134(d)(1)(ii)]

Explain that there are two basic types of respirators.

- Air Purifying Respirators (APRs): Protects by filtering contaminants out of the air through a filter

- Supplied Air Respirators (SARs): Supply own source of uncontaminated air (Read White Resource manual for more information about SARs)

(At this point you should say that this session will focus on the air purifying type)

Limitations of APRs:

- **O_2 must be greater than 19.5%** (APRs do not supply any oxygen). All oxygen-deficient atmospheres are considered IDLH (Immediately Dangerous to Life and Health) according to 1910.134(d)(2)(iii) so supplied air respirators are required.

- **The identity of the chemical must be known so appropriate cartridges/canisters can be used**

  Hold up a couple of gas/vapor cartridges and bring out the point that they are different colors. Bring out the reason they are color coded because they are chemical specific and should be wrapped when taken from their storage site. Since they are chemical specific, this should lead to the conclusion that you must know what the chemical is before you can select the proper cartridge.

  The respirator must either be equipped with an **end-of-service-life indicator** (ESLI) certified by NIOSH for the contaminant **or the employer must have**

a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. The rationale for the change schedule must be described in the respirator program. [1910.134(d)(3)(iii)]. Previously a contaminant had to have adequate warning properties or an ESLI. The problem with adequate warning properties is that not everybody may be able to detect it.

Particulate respirators/cartridges

Hold up a particulate cartridge. Bring out how a particulate cartridge works and how to know when it needs replacing. This is a good time to bring out about how the breathing rate of the wearer can have an impact on how long the canister or cartridge can be used.
In the case of a particulate cartridge, they actually become more efficient as more particles get built up. But this can eventually make it hard to breathe through. This is a good time to bring out that since wearing a respirator can be stressful, one must have medical clearance before being allowed to wear one.

Quickly go over **42 CFR Part 84** regarding particulate filters

NIOSH recently developed a new set of regulations in 42 CFR 84 (also referred to as "Part 84") for testing and certifying the particulate filter for Air Purifying Respirators (APRs). The two things that have changed are:

! The size of the particle used to challenge the filter media is now smaller so the filter has to be better in order to pass.

! The way the filters are labeled is different.

The new labeling is easiest to remember if you use the following guide:

N for **NOT** resistant to oil

R for **RESISTANT** to oil

P for oil **PROOF**

Note! What this means is that if **oil is suspected** in the atmosphere where the respirator is to be used, you **CANNOT use an "N" type filter**. NIOSH recommends that "N" or "R" filters not be used for more than 8 hours unless further testing is done of the filter media. For more details about this, consult the NIOSH Guide to the Selection and Use of Particulate Respirators Certified Under 42 CFR 84.

You will see these letters followed by one of three numbers. The numbers are **100** (99.97% efficient), **99** (99% efficient), & **95** (95% efficient). **The higher the number, the more efficient the filter.** For example:

N100 NOT resistant to oil & 99.97% efficient

N 99 NOT resistant to oil & 99% efficient

N 95 NOT resistant to oil & 95% efficient

R100 RESISTANT to oil & 99.97% efficient

R 99 RESISTANT to oil & 99% efficient

R 95 RESISTANT to oil & 95% efficient

P100 oil PROOF & 99.97% efficient

P 99 oil PROOF & 99% efficient

P 95 oil PROOF & 95% efficient

This information is nice to know when selecting particulate cartridges for elastomeric facepieces. However, don't forget the importance of "fit testing". The paper disposable respirators will use the same labeling system but they must also be fit tested which may prove to be more difficult than the tight-fitting facepieces.

Medical evaluation:

Before you are required to wear a respirator you must be medically evaluated! This must be done by a physician or other licensed health care professional (PLHCP) who perform the medical evaluation using a medical

questionnaire or an exam. If a questionnaire is used, this information is considered confidential [1910.134(e)(4)(i)].

If a worker answers "Yes" to any of the questions #1 - #8 in Section 2, Part A of Appendix C, then a medical exam is required [1910.134(e)(3)(i)]. For example, the first question asks, "Do you smoke?" so all smokers are required to have medical exams before being allowed to wear a respirator. The mandatory questionnaire is found in Sections 1 and 2, Part A of Appendix C of 1910.134. If the exam is used in place of the questionnaire, it must get the same information as is on the questionnaire [1910.134(e)(2)(ii)]. Consult 1910.134(e) for other requirements regarding medical evaluation.

Fit Testing (Qualitative vs Quantitative)

Once the type of respirator has been selected, the respirator must be fit-tested to make sure it fits properly. With the variety of respirators that are available, everybody should be able to get a good fit. However the Respiratory Protection Standard [CFR 1910.134(f)] says the following about respirator fit:

"*Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepeice, the employee must be fit tested with the same make, model, style, and size of respirator that will be used.*"

- **Qualitative (called QLFT in the standard)** - There are several qualitative methods:

  Banana Oil (isoamyl acetate)

  Irritant Smoke (stannic oxychloride)

  Bitrex J (denatonium benzoate)

  Saccharin

  Proper protocol can be found in Appendix A of 1910.134 which is a mandatory appendix to the respirator standard.

! **Limitations of qualitative methods:**

The worker may become desensitized to test agent and not be able to detect it during the actual fit testing.

The test is subjective

Some of the test agents can be toxic. For example, saccharin is a suspected carcinogen and NIOSH says there is no safe level of exposure to suspected carcinogens. Also, banana oil (isoamyl acetate) has a PEL.

! **Quantitative (called QNFT in the standard)** - Your respirator is probed and connected to a device that measures leakage (not a subjective measurement).

There are three ways of doing this. One uses a non-hazardous test aerosol. Another is the Portacount (condensation nuclei counter - this device measures dust in the ambient air and detects how much of that dust leaks into the facepiece during the fit test). The third is the Dynotech Fit Tester 3000 (controlled negative pressure). Here is how the first two methods work (the test aerosol and Portacount):

$$\frac{\text{Co (Conc. outside facepiece)}}{\text{Ci (Conc. inside facepiece)}} = \text{FF (Fit Factor)}$$

$\frac{50{,}000}{500} = 100$ $\frac{50{,}000}{5} = 10{,}000$

Worst fit → **Better fit**

The higher the Fit Factor, the better the fit!

<u>At this point ask for a volunteer to come and go through a fit test:</u>

Have the first one go through the Saccharin

Have the second volunteer go through the portacount

Once properly fitted for a respirator, remember there are several things which may change and prevent a good seal on a respirator [1910.134(f)(3)]:

- ! makeup
- ! skull cap
- ! scars
- ! glasses
- ! an obvious change in body weight
- ! dentures
- ! facial hair

Other things to know about respirators and the respirator standard:

Training:

You must be trained before you can wear a respirator. This training must include:

- ! Why the respirator is necessary and how improper fit, usage, or

maintenance can affect the protective fit of the respirator.

- What the limitations and capabilities of the respirator are
- How to use the respirator in emergency situations including what to do if the respirator malfunctions
- How to inspect, put on, and remove the respirator as well as how to check the seals of the respirator.
- What the procedures are for maintaining and storing the respirator.
- How to recognize medical signs and symptoms that may prevent effective use of the respirator.
- The general requirements of the respirator standard

This training must be given before the worker has to use a respirator in the workplace. There must also be annual retraining however this may occur sooner if there are changes in the workplace that makes previous training obsolete.

Summary of both sessions: (5 minutes)
Write on flip chart

Level of Protection

	Respirator	**Skin**
Level I:		

Level II:

Level III:

Level IV:

Level V:

Then explain in your words why it is important to understand the whole process of picking PPE and Respirator protection before you start to do mold removal.