SAND2012-2458P

Personal Protective Equipment (PPE)

Instructor Guide

Sandia National Laboratories
International
BIOLOGICAL THREAT REDUCTION

BIOSECURITY ENGAGEMENT PROGRAM

CBEP
Cooperative Biological Engagement Program

Welcome & Introductions

Slide 1

Introduce Instructor(s):

[Introduce others associated with the training, as appropriate]

Name

Affiliation

Representation (I'm here on behalf of. . .)

Quick Experience Glimpse

Relevancy of the Course to your experience

Welcome & Introductions

Before you introduce yourselves, I'd like to provide some reminders about this facility and the training:

1. Restrooms are. . .
2. Exits are. . .
3. Evacuation procedures are. . .
4. [any escort or restricted access procedures]
5. We will have intermittent breaks during the course, but please feel free (or not) to take a quick break if you need to at other times during the course
6. Beverages and snacks will be available at (time) and at (location). You may/may not eat and drink in this room
7. Please silence any cell phones or other noise-making devices.
8. Others. . .

Slide 2

Welcome & Introductions

Let's go around the room and let each of you introduce yourself. Please tell us your name, where you work (organization and/or title, as appropriate), and what you hope to gain from the course.

Ground rules

This will be a very interactive session and you will learn the most if you participate fully. We will not intentionally force any one to speak or to do an activity that embarrasses them – if you are uncomfortable, please speak to one of the leaders. For those of you who like to talk, please share your expertise but be aware of those around you who may be quieter and give them time to share their opinion as well. We ask that everyone respect the break times and report back promptly when asked to do so. But most of all, we want to make this a fun time to learn, so remember to smile and enjoy yourself!

Transition to Objectives

Goal

To review the Action Plan and Learning Objectives for the course and to solicit any additional learning goals from the participants.

Time

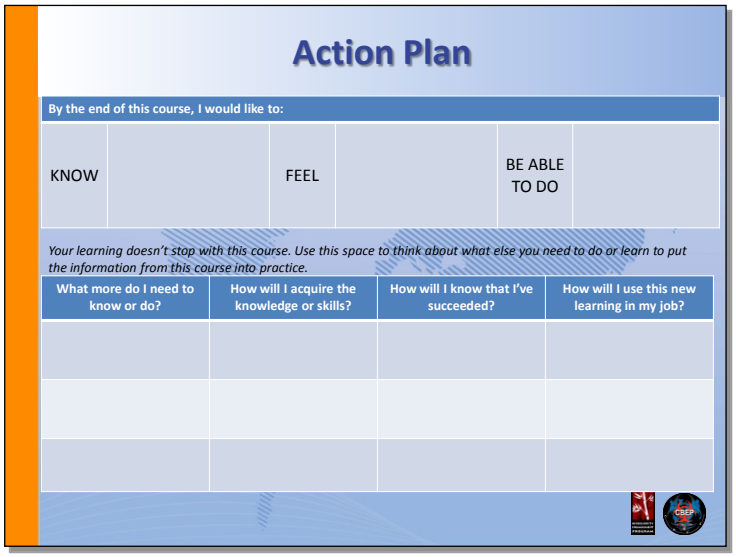
20 minutes

Welcome & Introductions

Key Messages for Instructor

1. Understand why PPE is one of the key controls to mitigate biorisks but in the last level in the “Hierarchy of Controls” for several reasons.
2. There are many types/kinds of PPE with various advantages and limitations
3. The selection of PPE is based on several factors but most importantly on a thorough risk assessment.
4. It is important to plan the order of donning and doffing PPE and follow that plan to reduce risk.

Slide 3

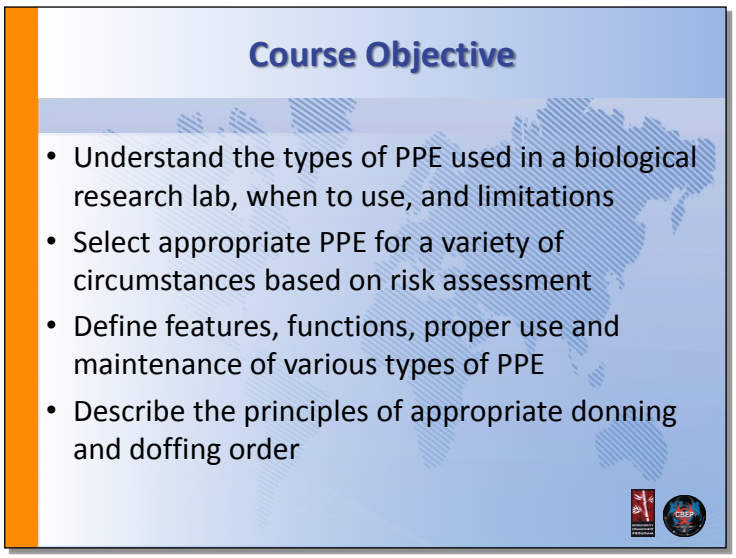


Welcome & Introductions

Instructions for the Action Plan handout:

- The Action Plan handout is on page __ of the student guide.
- It is designed to help you assess your learning of the material as we go through the course. It is also referred to as a learning contract.
- Go over each section of the Action Plan. . .
- The sections KNOW, FEEL and DO are designed to help outline personal learning objectives for this course.
- Ask each participant to think about what they would like to be able to KNOW, FEEL, and DO once this course is completed
- Tell the students that this is their own Action Plan. It does not need to be shared with anyone. It can be used during the course and after the course to help continually reach learning goals.
- Allow 5 minutes

Slide 4



Welcome & Introductions

Background Information for Instructor

Review the course objectives, these can be read from the slide. Check for understanding and verify that these objectives are consistent with student expectations.

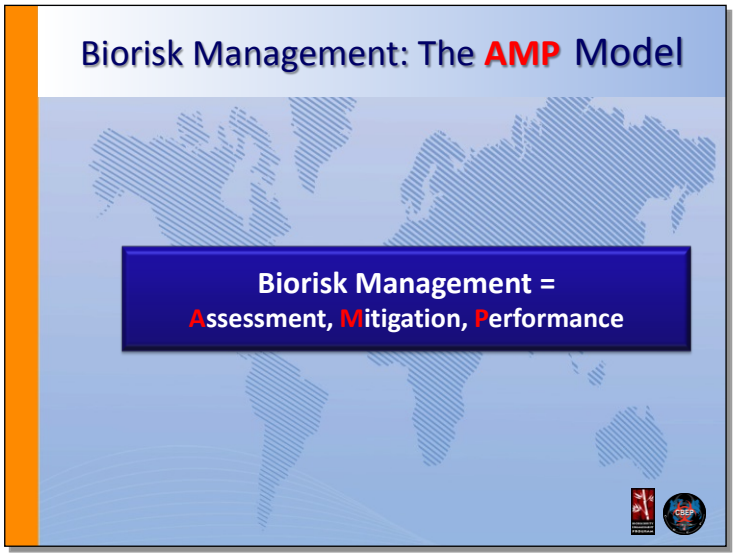
Capture any additional KNOW, FEEL, or DO or other learning goals

Capture any learning goals that will supplement course objectives and address any that are outside the scope of the course.

This course is flexible in nature. If there is a learning goal that is easily incorporated into the course, feel free to add it. Please note successful additions and consistently requested learning goals in the evaluation portion of this course and/or to GBRMC administrators.

Biorisk Management

Slide 5

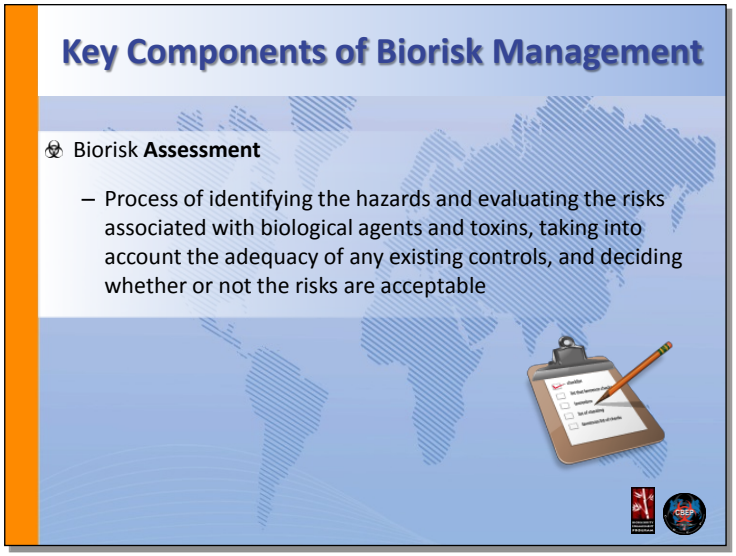


Background Information for Instructor

- Review the AMP model of Biorisk Management with the participants.
- The following three slides provide specific definitions for A, M, and P.
- While PPE is considered a mitigation strategy, the use of PPE is an important part in managing biorisks and touches on all three components.
- Remind them that in order to identify the need for PPE and select the appropriate PPE there must be a hazard assessment.
- Performance measures can help determine if determine if PPE use is working to reduce biorisk and ensure that the right PPE is being used appropriately.

Biorisk Management

Slide 6



Background Information for Instructor

The instructor uses the following three slides: Biorisk Assessment; Biorisk Mitigation; and Performance to define key components of biorisk management

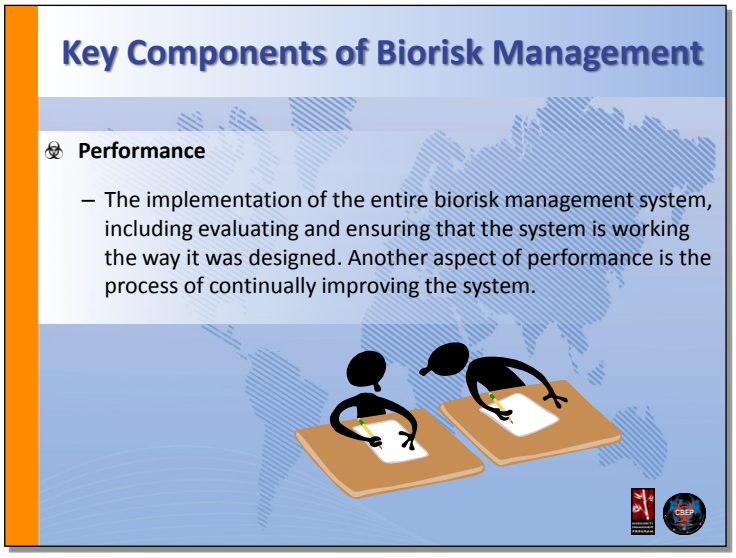
Slide 7

Biorisk Management

Background Information for Instructor

The instructor uses this slide and following slide (Performance) to define key components of biorisk management

Slide 8



Background Information for Instructor

The instructor uses this slide to define key components of biorisk management

Biorisk Mitigation Strategies

Slide 9

Mitigation Control Measures

- ***Engineering Controls***: Physical changes to work stations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduce or prevent exposure to hazards
- ***Administrative Controls***: Policies, standards and guidelines used to control risks
- ***Practices and Procedures***: Processes and activities that have been shown in practice to be effective in reducing risks
- ***Personal Protective Equipment***: Devices worn by the worker to protect against hazards in the laboratory

Biorisk Mitigation Strategies

Lecture

Engineering controls involve:

- Physically changing the work environment and include such things as:
    - Biological Safety Cabinets
    - Puncture resistant sharps containers
    - Directional airflow
    - Safety centrifuge cups, etc.

Administrative controls involve:

- Changing how or when workers do their jobs
- Creating policies for limiting access

Practices and procedures involve:

- Training workers how to perform tasks in ways that reduce their exposure to workplace hazards.
    - Not recapping needles
    - No mouth pipetting
    - Practices that reduce or eliminate the generation of aerosols, etc.
    - Properly isolating biohazards

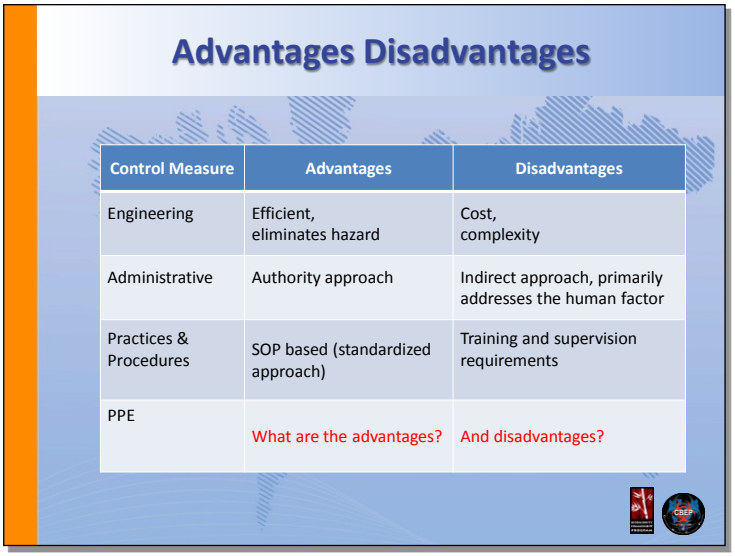
Background Information for Instructor

This should be a review slide for participants.

Review of Hierarchy of Controls. Activity to discuss advantages and disadvantages of PPE and review the routes of exposure.

Biorisk Mitigation Strategies

Slide 10



Small group activity (5 minutes).

Activity Instructions (to students)

1. Discuss the advantages and disadvantages of PPE for five minutes.
2. These can be posted/written on your flip charts.

You have 15 minutes to complete this activity

Directions for Instructor:

- Briefly present some of the advantages and disadvantages of the various control measures.
- As a review exercise, divide into small groups and have each group discuss the advantages and disadvantages of PPE for five minutes.
- These can be posted/written on their flip charts. Alternatively, facilitator can query each group

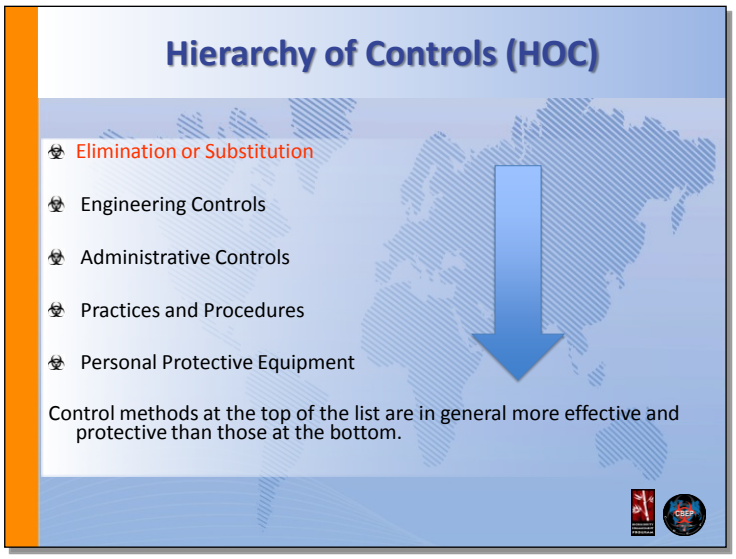
Biorisk Mitigation Strategies

Expected Responses

- Advantages: Ease of use, relative cost
- Disadvantages: Does not eliminate hazard, if PPE fails exposure happens, uncomfortable, may limit ability, only protects the person wearing it

New Responses from Students:

Slide 11



Biorisk Mitigation Strategies

Lecture

Elimination or substitution should be considered first and involves removing the hazard from the equation.

- For example choosing a PCR method instead of a culture method for diagnosis; using a less virulent strain.

Using personal protective equipment is often essential, but it is generally the last line of defense after engineering controls, work practices, and administrative controls.

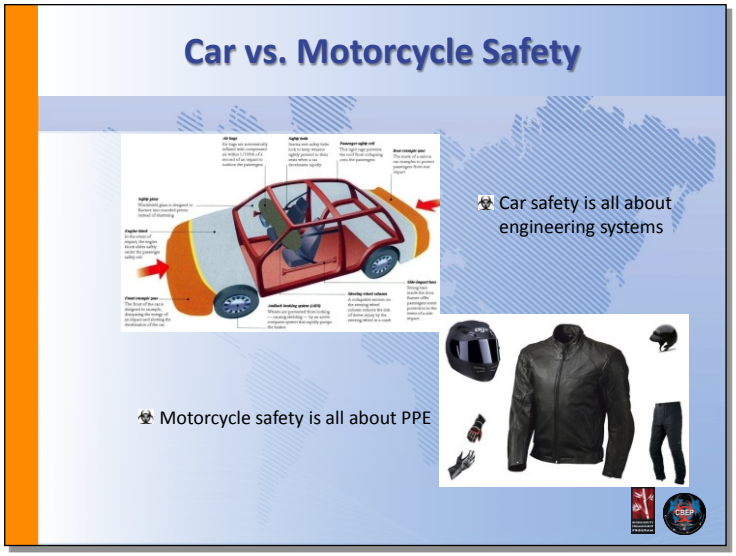
- The use of PPE signifies that the hazard could not be controlled by other methods.
- PPE only protects the person wearing it, unprotected workers in the same area will be exposed.
- PPE compliance depends on human reliability.
- Failure of PPE means that the worker “will be” exposed.
- PPE may restrict the wearer to some extent by limiting mobility or visibility, or by requiring additional weight to be carried. Thus creating additional hazards.

Background Information for Instructor

This should be a review slide for participants.

Biorisk Mitigation Strategies

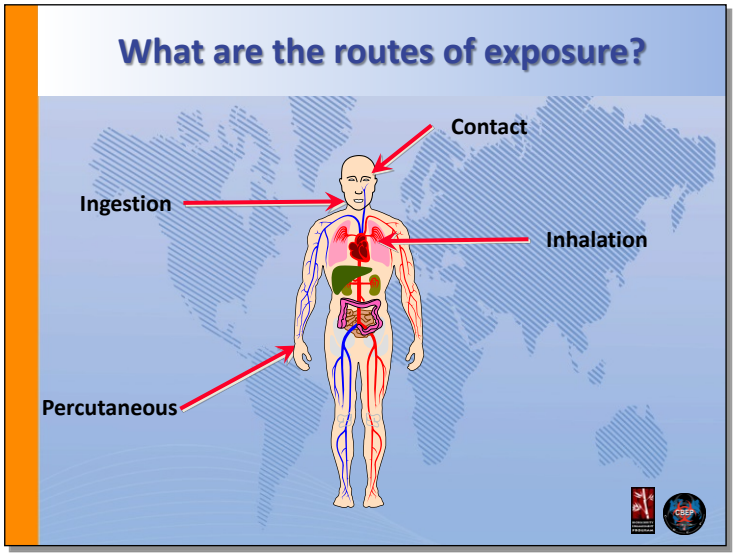
Slide 12



Background Information for Instructor

This slide demonstrates the differences between engineering controls and PPE. Engineering controls in general remove the hazard. PPE leaves one in the elements.

Slide 13



Biorisk Mitigation Strategies

Background Information for Instructor

Use this slide to review the routes of exposure. PPE is designed to provide protection to specific routes. The instructor can then point to a particular route of entry and solicit examples of PPE that protect the wearer from transmission via that particular route.

Slide 14

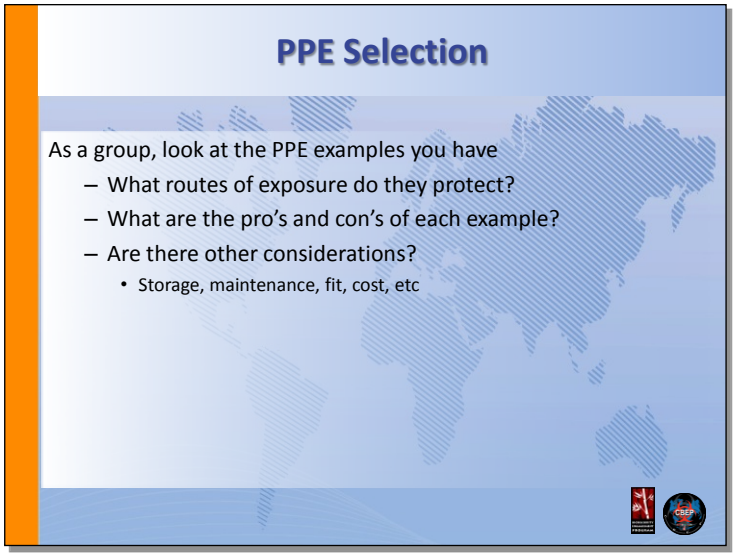
Take a Break (10-15 minutes)

Time Check

You should be approximately 1 hour and 10 minutes into the course. You have 3 hours of the course remaining. Creation of PPE trading cards is next.

Selection of PPE

Slide 15



Selection of PPE

Small group activity (60 minutes).

Activity Instructions (to students)

- Each group will receive a stack of PPE "trading cards"
- Each group will receive a stack of PPE "trading cards" from one of the following categories:
    - Category 1: Lab coats, scrubs, gowns, aprons, and coveralls
    - Category 2: Gloves, head and shoe coverings
    - Category 3: Eye and face protection
    - Category 4: Respirators
    - Be prepared to present to the class, the purpose and use of each item, what routes of exposure they protect from, pro's and con's of each example and when one item might be used and when not to use it.

You have 60 minutes to complete this activity

Directions for Instructor:

- Allow the groups 20 – 30 minutes to discuss and write down their conclusions. Each group will then present their category of PPE to rest of the class and discuss in general uses, limitations, pro and cons, and other considerations for items in their category. The following four slides can help guide the discussion.
- 30 minutes for small group discussion; 30 minutes to present. 1 hour total for this activity
- Monitor group discussion – making sure that other factors for using each item are also being considered (storage, maintenance, fit, cost, etc.).
- Following up the class discussion, bring up that some of the items should not be used in a lab (e.g. flip flops) and hopefully the during the group discussion they will come to this conclusion.

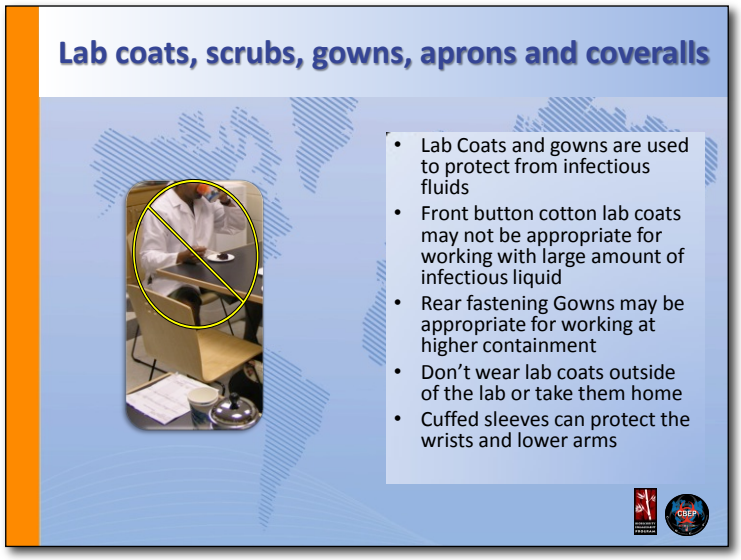
Selection of PPE

Expected Responses

- The following four slides contain expected responses

New Responses from Students:

Slide 16



Lecture

Lab coats can become contaminated. Prudent practices dictate that one should not wear contaminated clothing outside the lab or bring contaminated clothing home.

Selection of PPE

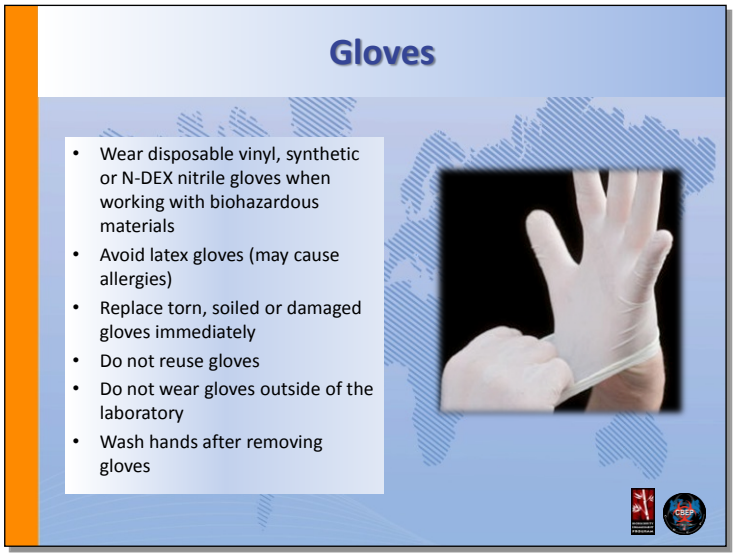
Background Information for Instructor

Have the group that reviewed lab coats (Category 1) stand up and present their findings to the rest of the class.

After they are done, use this slide to summarize and discuss some of the general considerations for lab coats etc.

- The participants should also provide specific examples of when an open front lab coat should be worn and when a wrap-around or solid-front gown may be more appropriate.
- Even the best lab clothing provides little protection if it is not worn properly (e.g. if a lab coat is not buttoned).
- Another factor to consider is knit cuffs vs. loose cuffs (or no cuff).
    - Knit cuffs make it easier to bring a glove over the lab coat sleeve and minimize hanging sleeves that could knock over or come in contact with hazardous materials.

Slide 17



Selection of PPE

Background Information for Instructor

Next have group 2 come up and share with the class their findings regarding Category 2 (gloves, head and foot protection).

After they are done, use this slide to summarize and discuss some of the general considerations for disposable exam type gloves.

- The participants should also discuss the use of other types of specialized gloves and when they may be necessary: protection from heat and cold; those that provide various degrees of protection from chemicals; puncture and cut resistant gloves.
- The following three slides should also be reviewed to ensure that key information about gloves, head and foot coverings are discussed.

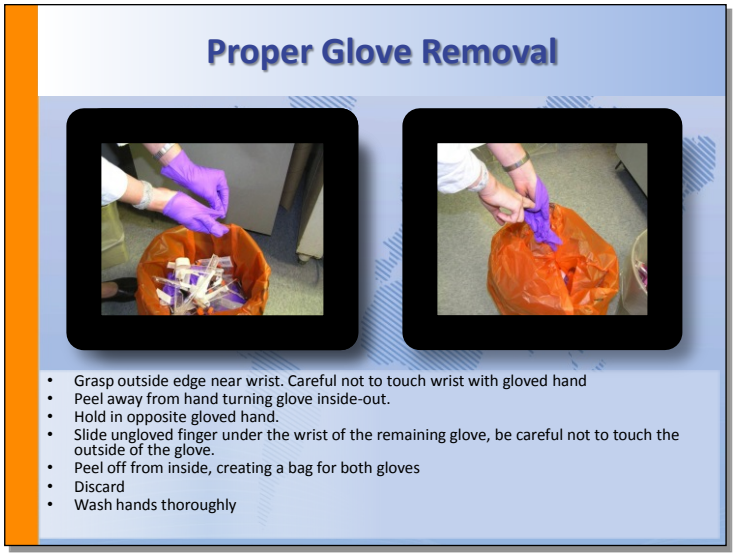
Slide 18

Background Information for Instructor

Use this slide as a reminder that gloves need to removed before handling “common” areas of the lab.

Selection of PPE

Slide 19



Lecture

An additional consideration for any PPE is how you remove it to avoid contamination.

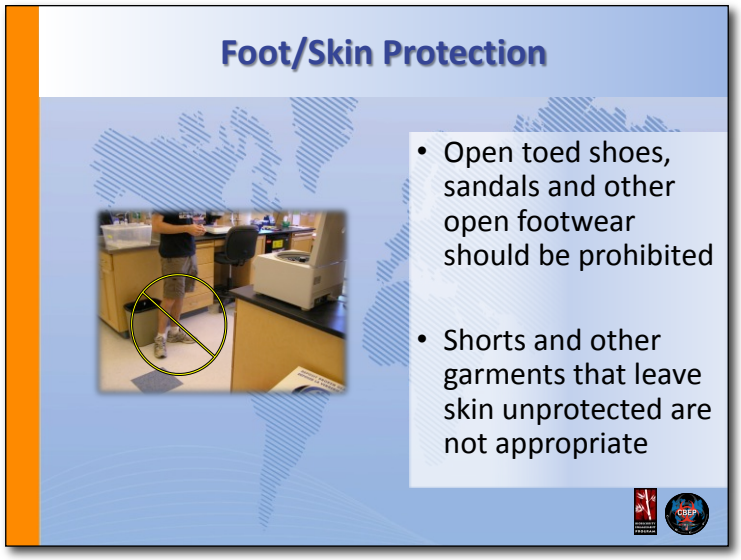
In general, since gloves are the most likely of all PPE to be contaminated, it is important that one uses a procedure such as that described above to avoid contamination. However, you should use the same principle when removing any kind of PPE

Background Information for Instructor

The instructor may ask for input from the participants in how to properly remove a contaminated lab coat or gown; how to remove a respirator or mask, etc.

Selection of PPE

Slide 20



Background Information for Instructor

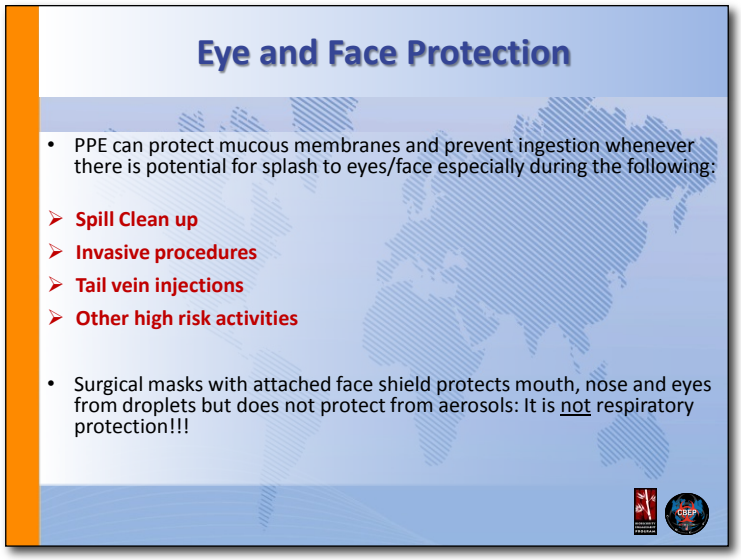
Use this slide to discuss other PPE that covers skin.

Open toe shoes and sandals are not recommended as laboratory footwear, as they do not provide sufficient protection.

Shoe coverings are generally not necessary in biomedical labs for routine procedures but could be helpful in preventing outside contamination for product protection and during spill cleanup procedures.

Selection of PPE

Slide 21



Background Information for Instructor

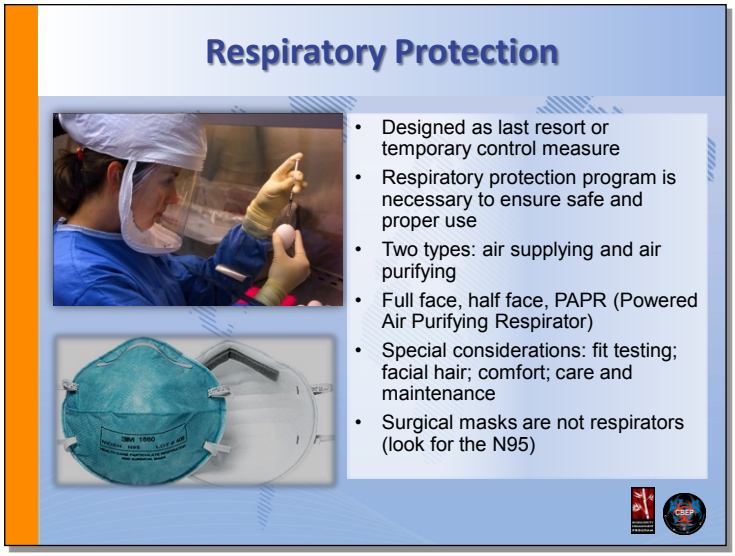
Next have group 3 come up and share with the class their findings regarding Category 3 (eye and face protection).

After they are done, use this slide to summarize and discuss some of the general considerations for face protection.

- There are numerous examples in the literature of laboratory-acquired infections in laboratory personnel due to facial exposures to infectious agents.
- You can use this slide to discuss the pro's and con's of various eye and face protection PPE.
- It is important that participants recognize that a surgical type face mask provides very little protection from aerosols but can help provide protection from minor splash and splatter and keeping contaminated hands from the face

Selection of PPE

Slide 22



Lecture

- Respiratory protection is necessary when workplace air is unsuitable for breathing.
- Respirators are designed as last resorts when aerosols cannot be controlled through other means (engineering controls such as BSC or fume hoods; administrative controls; or practices and procedures that reduce the chance of aerosols).
- Respirators should be considered for emergency response operations and in cases where aerosols cannot be controlled through engineering.
- A respiratory protection program includes elements such written SOPs, medical evaluation, user training, respirator maintenance procedures, and proper fit testing and is necessary to ensure safe and proper use.

Selection of PPE

Lecture

There are two general classes of respirators:

- Those that supply breathable air from a gas cylinder or air compressor;
- Those that purify air by drawing contaminated air through a particulate filter or chemical cartridge.

Air purifying respirators can be further subdivided into two categories:

- Non-powered air-purifying respirators
- Powered air-purifying respirators (PAPR)

Respirators can also be described by the type of face piece and form a tight seal either half of the face leaving the eyes exposed or those that are full face and provide eye protection as well.

PAPR do not need to be tightly fitted to the face and therefore do not need fit testing and can be worn with facial hair.

Health care workers routinely use surgical masks as part of their PPE. Surgical masks are designed to protect the patient against large droplets expelled by the mask wearer or to protect the wearer from large droplets and splash/splatter of infectious liquids. Surgical masks do not provide adequate protection against inhalation of infectious aerosols.

Selection of PPE

Slide 23

Take a Break (10-15 minutes)

Time Check

You should be approximately 2 hours and 30 minutes into the course. You have 1 hour, 45 minutes of course remaining. Selecting appropriate PPE is next.

Selection of PPE

Small group activity (35 minutes).

Activity Instructions (to students)

- Each group will be given a scenario card, which will be used along with the PPE trading cards.
- Use the cards to work together and come up with the most appropriate PPE for your particular scenario.
- You will present your scenario and PPE choices to the class.
- The rest of the class and the instructor will review your choices and your group can then modify the PPE selection after hearing their feedback.

You have 60 minutes to complete this activity

Directions for Instructor:

- The scenario trading cards consist of information for a pathogenic agent, as well as information for a hypothetical research group that is planning on working with that agent.
- The students will come up with the appropriate PPE needed to work with the agent/scenario card they have been given.
- Agents: Bacillus anthracis, Prions, Rabies Virus, Salmonella typhi, Shigella dysenteria
- Monitor each group's discussions making sure that they are taking into consideration the various routes of exposure for the agent that they are given.
- They should be given 15 minutes to review their scenario and choose from the PPE trading cards the PPE that is appropriate for their given scenario.
- Then each group will be give 5 minutes to present their scenario and the PPE that they chose.

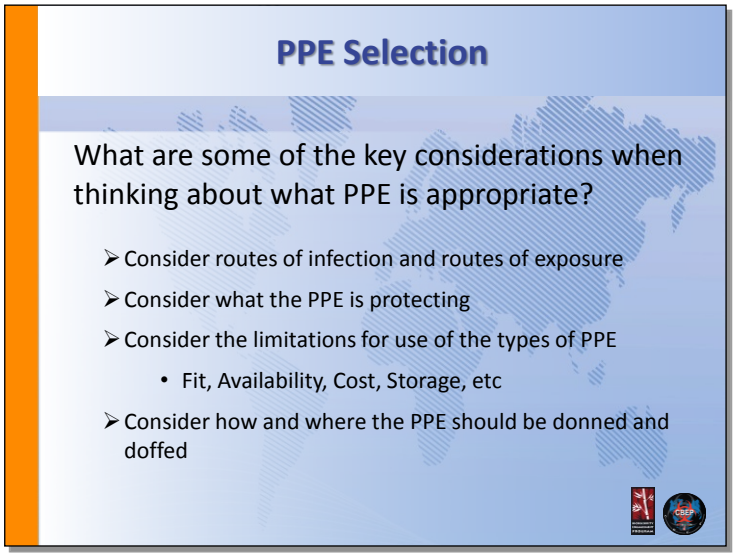
Selection of PPE

Expected Responses

- Various – in general, if students should use PPE that will protect against the route of exposure for each particular agent.

New Responses from Students:

Slide 24



Selection of PPE

Plenary Discussion (5 minutes).

Statements to consider:

1. Selection of PPE must be based on a thorough risk assessment, which includes the following key considerations.
2. Begin by considering the route of transmission for the agent(s) present in the lab and the additional hazard the procedures or job tasks may introduce.
3. For example, work with large volumes, centrifugation, shaking, mixing, pouring, stirring, and other aerosol generating activities; use of hazardous chemicals; work with needles, toothpicks, blades and other sharps; work with animals; work with open flames or heat sources; etc.
4. Another consideration is the various limitations of PPE: work with gloves can reduce dexterity; respirators need to fit tested and worn properly (e.g. no facial hair); PPE must fit properly and various sizes may need to be supplied. There could also be storage and cost issues associated with different kinds of PPE
5. Finally, consideration must be given to how and where PPE is donned and doffed; how it needs to be maintained; and how to dispose of used PPE

Directions for Instructor:

- Use this to review what they did in the case activity. Discuss the general principals they used to select their PPE.

Selection of PPE

Expected Responses

- Will vary according to the agent. Make sure they are in accordance with the above items.

New Responses from Students:

Slide 25

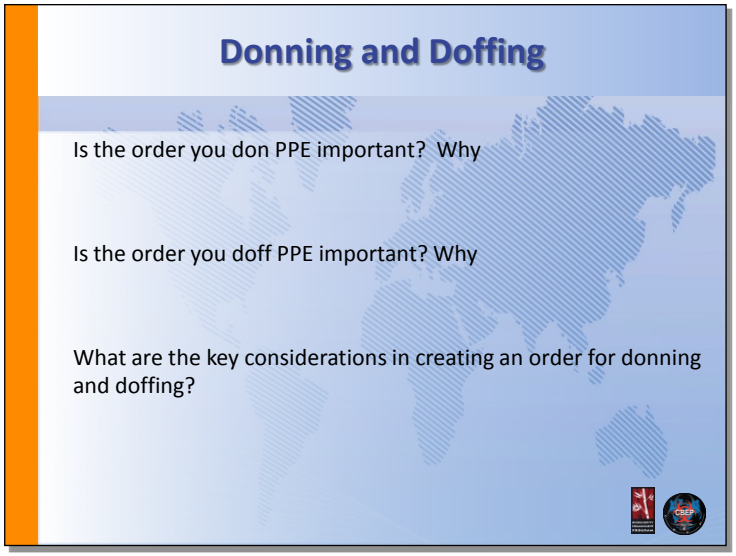
Take a Break (10-15 minutes)

Time Check

You should be approximately 4 hours into the course. You have 15 minutes of course remaining. Donning and doffing order is next.

Donning & Doffing PPE

Slide 26



Plenary Discussion (10 minutes).

Question to consider:

1. Is the order you don PPE important? Why
2. Is the order you doff PPE important? Why
3. What are the key considerations in creating an order for donning and doffing?

Directions for Instructor:

- Have students respond verbally and discuss
- Record on board or flip chart if needed

Donning & Doffing PPE

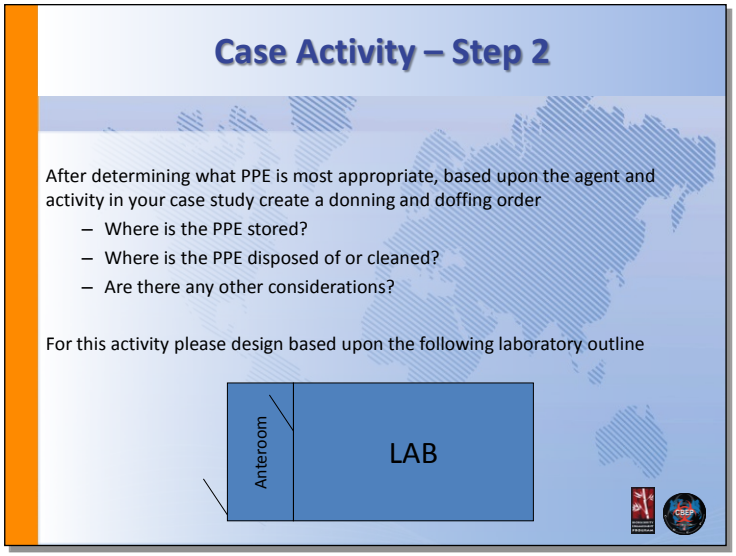
Expected Responses

- **Expected Answer Question 1**: Yes in some cases. Some PPE needs to go over the top of others. For example, 1st pair of gloves under the gown cuffs, second pair of gloves over the gown cuffs. If using a PAPR does the filter/battery belt go over or under the laboratory gown?
- **Expected Answer Question 2:** Definitely. It is important to recognize that PPE may have become contaminated and the doffing order can help to avoid contamination coming in contact with uncontaminated skin. Also, how the PPE is removed (turning contaminated side outside to in and avoid touching or coming into contact with contaminated surfaces). Recognize that removing PPE could result in generation or re suspension of aerosols so if wearing a respirator is should be the second to last item removed (last item is the inner glove**).**
- **Expected Answer Key Considerations:** Location of Donning and Doffing. Ways to minimize contamination. Protection level needed.

New Responses from Students:

Donning & Doffing PPE

Slide 27



Background Information for Instructor

This is the second part of the case activity. Using the PPE that they determined in the previous step, they should use the same scenario to discuss donning, doffing order, where/how to dispose of PPE, storage and other considerations.

Allow 10 minutes to discuss these issues and another 15 minutes in plenary for each group to present their strategies and discuss together.

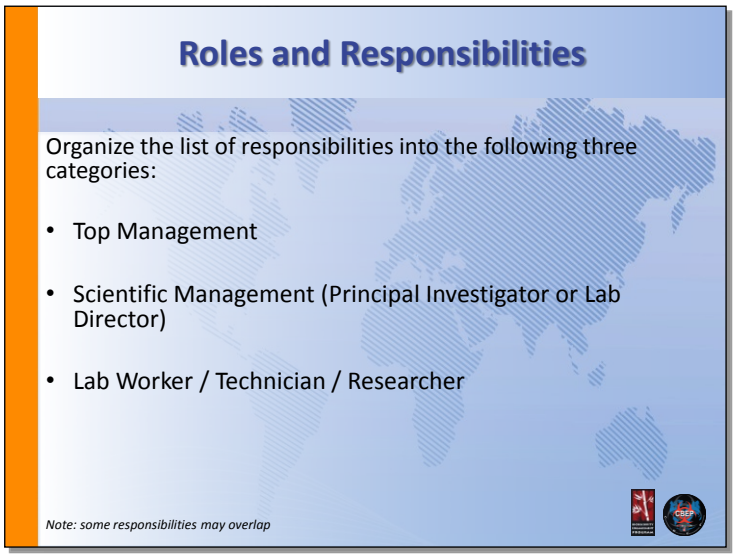
PPE Program Management

Slide 28

Background Information for Instructor

PPE program management will be considered with all aspects of PPE use. Highlight that this is a continual cycle that leads to overall improvement over time.

Slide 29



PPE Program Management

Small group activity (10minutes).

Activity Instructions (to students)

- On sticky notes write as many PPE-based responsibilities you can think of on sticky notes.
- Then categorize the responsibilities into the role categories (Top Management, Scientific Management, Lab Worker), by sticking your sticky notes underneath the appropriate heading.

You have 10 minutes to complete this activity

Directions for Instructor:

- Prepare three large flip chart pages with the following categories at the top of each page: 1. Top Management 2. Scientific Management 3. Lab Worker
- Have the students categorize each responsibility under the appropriate role header.
- Take time to discuss any anomalies and move any of these responsibilities to a more appropriate role column if necessary. Note some of these responsibilities may fall under two or more of these categories.
- Allow 5 minutes for the students to come up with the responsibilities and then 5 minutes to categorize them.

PPE Program Management

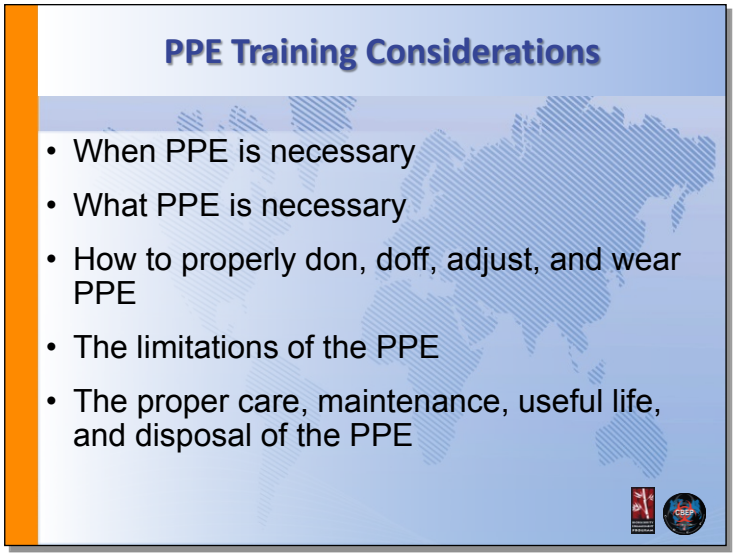
Expected Responses

- **Top Management:**
  - Identify and provide appropriate PPE
  - Establish SOPs and policies
  - Periodically review, update and evaluate
- **Scientific Management:**
  - Perform a risk assessment (could also go under top management)
  - Train employees
  - Replace worn or damaged PPE (could also go under Lab Worker column)
- **Lab Worker:**
  - Know how to properly put on . . .
  - Be aware of when PPE is necessary and follow SOPs for the use of PPE
  - Care for, clean and maintain PPE
  - Attend training sessions on PPE
  - Inform the supervisor of the need to repair or replace PPE
  - Understand the limitations of PPE (could go under all three categories)

New Responses from Students:

PPE Program Management

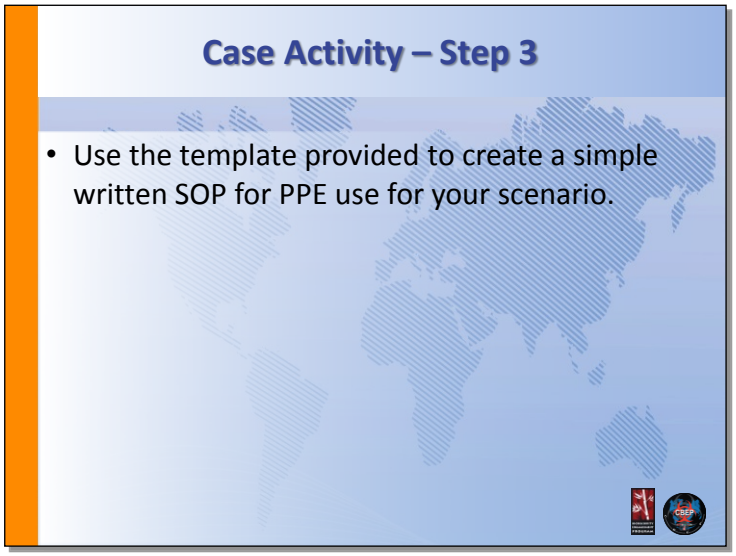
Slide 30



Background Information for Instructor

Use this slide to discuss what should be included in a training program. What personnel need to be trained in to use PPE. These are also the some of the same considerations that go into preparing a written SOP for PPE use. Presented by the facilitator.

Slide 31



PPE Program Management

Background Information for Instructor

Participants use the template provided to complete a simple SOP for their groups given scenario. The template will walk them through a review of all the concepts discussed:

PPE definition and how it fits with other control measures

Considerations for Selecting appropriate PPE

Donning and Doffing strategies

Program management

30 minutes.

Each group will then be given 5 minutes to present their SOP and each one will be critiqued and discussed in plenary

Transition to Review

Review

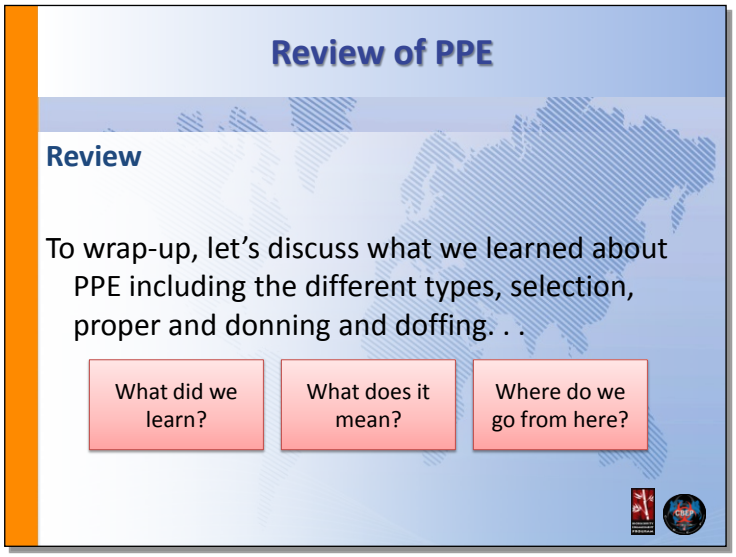
Goal

The purpose and goal of this module is to recap the key messages of the course and to conduct a “What? So What? Now What?” review of the course and key messages.

Time

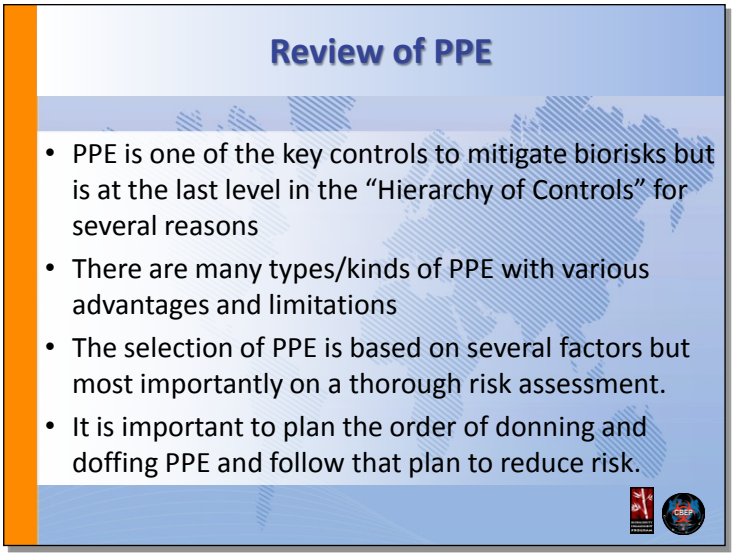
Allow 20 minutes to get through the Review section.

Slide 32



Review

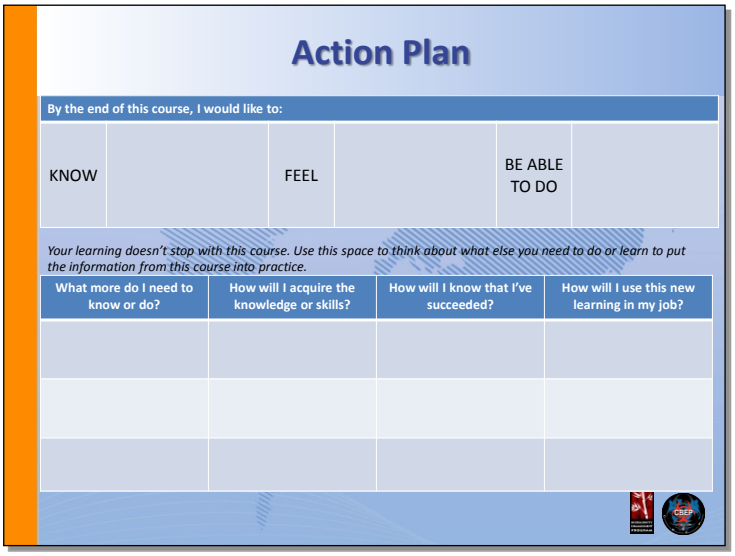
Slide 33



Review Key Messages

Include discussion on how activities/examples related to the Key Messages of the course and how the messages can be applied.

Slide 34



Review

Ask students to spend a few minutes reviewing and completing their action plan.

Slide 35

Level 1 Evaluation

- Ask students to complete the course evaluation and to put it in the evaluation box (alternately, give students instructions for completing the evaluation on-line).