Respiratory Protection

Generic GRRA500

Diablo Canyon Site Specific GRRA550

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Instructor Materials
1. This class is presented as web-based training.

Student Materials
1. None needed beyond a computer.

Lesson References
1. NANTeL Generic Respiratory Protection Training Student Guide.
2. California Code of Regulations, Title 8, Section 5144. Respiratory Protection
3. ACAD 00-007, Guidelines for Radiation Worker and Radiological Respiratory Protection Training, Section 3.
4. Regulatory Guide 8.15 - Acceptable Programs for Radiation Protection
5. 29CFR1910.134 - Occupational Safety and Health Standards - Respiratory Protection
6. 10CFR20 subpart H - Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas
7. ANSI Standard Z88.2 - American National Standard for Respiratory Protection

Remarks
1. NANTeL Generic Respiratory Protection Training.
2. This lesson is designed for Computer/Web-based Training
3. The information in this lesson will be evaluated by the use of a written test. (80% passing score)
Introduction

This lesson covers the NANTeL generic respiratory protection lesson.

Include the following in the introduction:

- Training goal to prepare the student with the knowledge necessary to function as a respirator wearer.
- Effectiveness measure: short term – 80% score on the generic section of the respiratory protection examination.
Objectives

Terminal objective

There are no terminal objectives directly associated with this lesson.

Enabling objectives

The following objectives apply to the lesson.

<table>
<thead>
<tr>
<th>#</th>
<th>Objective Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State the purpose of the respiratory protection program.</td>
</tr>
<tr>
<td>2</td>
<td>State the requirements that must be completed prior to using a respirator.</td>
</tr>
<tr>
<td>3</td>
<td>State the purpose of a fit test.</td>
</tr>
<tr>
<td>4</td>
<td>Identify the factors that can affect the proper fit of a tight-fitting respirator.</td>
</tr>
<tr>
<td>5</td>
<td>State the possible hazards the respirator wearer may be exposed to if respiratory equipment is not worn properly.</td>
</tr>
<tr>
<td>6</td>
<td>Recognize the effects of contaminants on the wearer if the respiratory equipment is not worn properly and contaminants are inhaled.</td>
</tr>
<tr>
<td>7</td>
<td>Describe the correct method for donning and removing various types of respiratory protection equipment.</td>
</tr>
<tr>
<td>8</td>
<td>Describe the steps for inspecting respiratory protection equipment.</td>
</tr>
<tr>
<td>9</td>
<td>Describe how to perform user seal checks for respiratory protection equipment.</td>
</tr>
<tr>
<td>10</td>
<td>State when user seal checks are required.</td>
</tr>
<tr>
<td>11</td>
<td>Define the term “assigned protection factor.”</td>
</tr>
<tr>
<td>12</td>
<td>Describe the basic operating principles of air-purifying and air-supplying respirators.</td>
</tr>
<tr>
<td>13</td>
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</tr>
<tr>
<td>14</td>
<td>Define the general application of an air-supplying respirator, and state the limitations on its use.</td>
</tr>
<tr>
<td>15</td>
<td>State the immediate actions to be taken if a respirator malfunctions during its use.</td>
</tr>
<tr>
<td>16</td>
<td>Describe the requirements for maintenance and storage of respirators.</td>
</tr>
<tr>
<td>17</td>
<td>Recognize the medical conditions and symptoms that could limit or prevent the effective use of respirators</td>
</tr>
<tr>
<td>18</td>
<td>Describe the circumstances under which a respirator user may leave the work area for relief from respirator use.</td>
</tr>
<tr>
<td>19</td>
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</tr>
<tr>
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</tr>
</tbody>
</table>
Program Purpose

Objective 1
State the purpose of the respiratory protection program.

Introduction
Why do I need this training? Why do you have to be trained in order to wear a respirator?
• It is required by law
• Respirators can protect your health if you know when and how to use them
• If worn incorrectly respirators can be ineffective or even dangerous

Need to know
The goal of any respiratory protection program is to limit the inhalation of airborne hazards. The federal government provides guidance on the use of respiratory protection equipment and how to achieve this goal.

Nice to know
Companies that require personnel to wear respirators must have a written program in place. This normally includes written policies and procedures, as well as experts who can help you. At nuclear plants, the radiation protection staff is often responsible for the respiratory protection program, but other experts such as industrial hygienists may be involved. Make sure you know the organization, policies, and procedures used at any facility where you work.

Standards
• ACAD 00-007, Guidelines for Radiation Worker and Radiological Respiratory Protection Training, Section 3.
• Regulatory Guide 8.15 - Acceptable Programs for Radiation Protection
• 29CFR1910.134 - Occupational Safety and Health Standards - Respiratory Protection
• 10CFR20 subpart H - Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas
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Program Purpose, Continued

Practice

The goal of the respiratory protection program is to
A. Limit lawsuits
B. Limit the inhalation of airborne hazards
C. Increase the comfort of workers
D. Teach workers to raise airborne concerns

Ans: B
Prior to Using a Respirator

Objective 2  State the requirements that must be completed prior to using a respirator

Need to Know  The following three activities must be completed before you will be allowed to wear a respirator:
- training
- a physical exam (medical)
- a fit-test (for tight-fitting respirators only)

Nice to Know: Training  Training will take place in more than one step. It consists of lesson material such as this course and hands-on training with a respirator. Some plants may have their own site-specific training used in conjunction with this training. Annual refresher training is required.

Nice to Know: Physical Exam  Not everyone is healthy enough to wear a respirator. Respirators can cause some stress to the heart and lungs. A physical exam (medical) is required for any person wearing a respirator to ensure that the individual can safely wear one. This is normally arranged by your employer. Changes in health between physicals may also require action on your part.

Nice to Know: Fit Test  A fit-test is used to determine if a particular respirator you will be using will properly fit your face. It is only required for “tight-fitting” respirator types because these have to seal against your face. A fit-test measures how well the respirator is working while you are wearing it.
Prior to Using a Respirator, Continued

Practice
You are assigned to wear a tight fitting respirator. Before you wear it, you must have
A. Training and sign a waiver
B. A fit test and experience with respirators of other kinds
C. A birth certificate and a consent form filled out
D. Training, medical exam, and a fit test

Ans: D
Fit Test

Objective 3
State the purpose of a fit test

Introduction
Most nuclear facilities use a quantitative fit-test in which dust particles in the air are sampled inside the respirator and are compared with dust particles in the air outside the respirator.

A fit-test is required for each different type of respirator that is expected to be worn. During the fit-test, you will undergo activities that simulate working conditions, to ensure you will get a good fit while doing your job.

Need to Know
The respiratory protection personnel who perform the fit-test will determine the size of respirator that is most likely to provide a good fit. If a good fit is NOT obtained, another size may be tried.

Once a size has been determined, you will always wear that size, unless further fit-testing demonstrates the need for a different size.

Cautions
1. Since a fit test requires wearing a respirator, most utilities require you to be current on your respirator medical BEFORE getting your fit test.
2. You must be clean shaven on the area that the mask fits upon before the fit test. That means that your moustache must be trimmed above your chinline.
3. If you need respirator glasses, get them before your respirator fit so you can get your adaptor for the mask you are going to wear.
4. If you wear contact lenses, wear them to the fit test and let the technician know you are wearing them.

Practice
The purpose of the respirator fit test is to
A. Determine the size of respirator that gives the best fit
B. Determine the protection factor of all respirators against all hazards for you
C. See how physically fit you are to wear a respirator
D. Give you practice in donning and removing a respirator in a specific time length

ANS: A
Affecting Proper Fit

Objective 4
Identify the factors that can affect the proper fit of a tight-fitting respirator.

Introduction
Normally, fit-tests are required annually. Because a fit-test ensures that the shape of your face and the respirator are a good match, things that could change the shape could be a concern. Check with the respiratory protection personnel if your face changes in any way that could affect your fit, because a new fit-test may be required.

Need to Know
Factors which may affect the proper fit of a tight-fitting respirator include:

- weight gain or loss
- scars in the seal area
- facial surgery
- new use of full dentures
- facial hair growth

Glasses
Regular eyeglasses can NOT be worn inside a respirator. The temple bar would be under the respirator seal and would prevent the respirator from sealing properly. Special respirator inserts (spectacle kits) are available. The fit test is a great time to bring up any special needs such as eyeglasses. Since the kits may have to be ordered it is good to make your needs known early.

Contact Lenses
Contact lenses can be worn in a respirator IF they were worn during the fit-test and it was documented. Make sure to tell the person performing the fit-test that you are wearing contacts. Be warned that some respirator types will have a continuous flow of air across your face. This can result in drying to the eyes and the contacts.

Practice
You have been on a very strict diet and have lost 50 pounds. This probably will not change anything in your mask fit because fit testing takes into consideration the flex of the face. (True or False)?
ANS: False
Hazards Exposed of Improper Wear

Objective 5  
State the possible hazards the respirator wearer may be exposed to if respiratory equipment is not worn properly.

Introduction  
Wearing a respirator poses inconveniences: hard to communicate, see, makes work more difficult. However, respirators do provide for health and safety of the worker. What happens if you do not wear your respirator properly?

Need to Know  
Wearing a respirator improperly may lead to
- Intake of radionuclides (possible internal radiation dose)
- Intake of industrial gases

Practice  
If you wear your respirator incorrectly it will still protect you because such things are overly engineered (TRUE or FALSE). ANS: False
Effects of Contaminants on Wearer

Objective 6

Recognize the effects of contaminants on the wearer if the respiratory equipment is not worn properly and contaminants are inhaled.

Introduction

Respirator wearers must understand the risks associated with wearing respirators and contrast these with the risks of breathing in radioactive materials (or other contaminants). The amount of radiation exposure associated with inhaling radioactive material is normally quite small. This would result in a small amount of radiation exposure, which theoretically could increase cancer risk slightly.

Need to Know

Possible effects of inhaling containates include:
- Irritation from chemicals
- Difficulty breathing or suffocation
- Nausea and vomiting
- Dizziness
- Disease
- Cancer risk increase
- Death

Practice

If the respirator you are assigned is supposed to be protecting you from the inhalation of radionuclides, what effects might you experience from wearing the respirator improperly?

A. Difficulty in breathing  
B. Nausea  
C. Increase risk in cancer  
D. Dizziness

Ans: C. Increased risk of cancer
Donning and Removing

Objective 7

Describe the correct method for donning and removing various types of respiratory protection equipment.

Need to Know: Donning

To put on a tight-fitting respirator mask, follow these steps:

1. Make sure the straps are fully extended.
2. Place your chin in the chin well of the facepiece.
3. Place the respirator against your face and pull the straps over your head, making sure there are no twists or kinks.
4. Pull the two bottom straps at the same time to snug the respirator on your face. Don’t pull them too tight or you could damage the respirator.
5. Now, pull the two temple straps at the same time.
6. Next, you need to further snug the respirator and align it vertically on your face by tightening the top strap.

Continued on next page
Donning and Removing, Continued

Nice to Know: Removing

Normally if you are working in an airborne radioactivity area, your protective clothing will include a hood worn over the top of the respirator to protect the head from becoming contaminated. The hood is removed before the respirator removal sequence begins.

Warning

Expect the respirator to have contamination on the outside. Remove it carefully to avoid spreading contamination to the surrounding area and to yourself.

Need to Know: Removing

To remove the respirator; lean forward, bending at the waist, and pull the respirator out and away from your head by holding on to the exhalation valve area. Do not loosen the straps or pull the respirator backward over your head. Remember to retrieve your glasses from inside (if you wear glasses).

Graphic: Removing

Continued on next page
Donning and Removing, Continued

Practice  The first part of your body you place (and tighten) into a respirator facepiece is your
A. Chin  
B. Temple
C. Back of your head
D. Top of your head

ANS: Chin
Inspecting

Objective 8
Describe the steps for inspecting respiratory protection equipment.

Introduction
Although a technician will inspect a respirator before it is issued to you, it is your responsibility to ensure that the respirator is in good working order every time you wear it.

Need to Know
Although respirators may vary in parts, the general method for inspecting respirators is as follows (following manufacturers' and station procedures):
• All parts must be in place
• Rubber components must not be damaged or rotted
• Face plate (lens) must not be cracked & should be clear to vision
• Straps should be extended and properly attached to the facepiece. (Stretch to inspect)
• The seal area should be smooth and free from defects
• Filters should be in place, tight and not expired (sorbent type only)
• The exhalation valve (diaphragm) should be in place and not stuck to the sealing surface.
• If it uses batteries, those should be fully charged.

Continued on next page
Inspecting, Continued

Graphic:
Negative Pressure Respirator

Nice to Know
Further inspection points will be detailed in the practical factors classes for each respirator.
Seal Checks

Objective 9

Describe how to perform user seal checks for respiratory protection equipment.

Introduction

Most negative pressure respirators (and some Self-contained Breathing Apparatus (SCBA) require two seal checks to be made: negative pressure test, and positive pressure test.

Need to Know:

Negative Pressure Test

To perform a negative pressure test:

1. Cover all inhalation openings to the mask.
2. Gently inhale with the mask on.
3. Hold your breath for about 10 seconds. The mask should stay collapsed toward your face.

If leakage is detected (by mask moving outward before the 10 seconds), take the following steps:

- Re-snug one or more straps
- Re-adjust the mask
- Re-perform the negative pressure test

Continued on next page
Seal Checks, Continued

Need to Know: Pos. Pressure Test

The **positive pressure test** is similar to the negative pressure test except that the user covers the exhalation valve and blows air out into the facepiece.Leaks will be evident if the respirator does not hold air. Cool spots will be felt where air is leaking.

NOTE: The MSA UltraElite Respirator cannot allow a Positive Pressure Test.

Graphic: Positive Pressure Test

Practice

What does the negative pressure test check?
A. Leaking around mask seal
B. Fogging at the nose cup
C. Claustrophobia
D. Leaking at the outlet valve

ANS: D
When Seal Checks

Objective 10  
State when user seal checks are required.

Need to Know  
Perform required seal checks – negative and positive (if possible) – before entering an area with airborne hazards.

Practice  
If you have a good fit at the mask fit testing, you do not need to do seal checks again (TRUE or FALSE)? ANS: False. Always do seal check(s) before entering an airborne area.
Assigned Protection Factor (APF)

Objective 11  Define the term “assigned protection factor.”

Introduction  How can you tell how good a respirator will be at protecting you from certain kinds of airborne contaminants? The assigned protection factor!

Need to Know  The expected level of protection provided by a respirator is called the assigned protection factor (APF). If a respirator has an APF of 100, then for every 100 particles in the air 1 will make it into the respirator. If the APF is 1,000, then for every 1,000 particles in the air 1 particle will enter the respirator. A respirator with an APF of 1,000 is removing more contaminants from the air than one with an APF of 100. The bigger the number is the higher the protection.

Nice to Know  The assigned protection factor depends upon how well the respirator fits (the fit factor) and what kind of airborne contaminant is there. Most airborne contaminants in a nuclear power plant are removed by high efficiency particulate (HEPA) filters. Some contaminants like tritium and noble gases are not affected by those filters at all.

Practice  You are about to enter a particulate atmosphere. The respiratory protection technician may assign you a respirator with an assigned protection factor of 500 or one with 1000. Which will protect you from more particles?
A. 500
B. 1000

ANS: B. 1000. The higher the assigned protection factor, the higher the protection, all other things being equal.
Air-Purifying vs. Air-Supplying

Objective 12 Describe the basic operating principles of air-purifying and air-supplying respirators.

Need to Know: Air-Purifying

Air-purifying respirators clean (purify) the air using a filter. Air passes through a filter (cartridge) before entering the respirator. Filters come in different types, too, depending on the airborne hazard and the form it takes. Filters can be:
- particulate
- gas
- combination gas and particulate

Need to Know: Air-Supplying

Atmosphere-supplying respirators provide a supply of air that is already free of airborne contaminants. Air is pushed into the respirator either from a compressor (via an air line) or from compressed air in a tank (similar to a SCUBA tank used by divers). The inside of the respirator stays at a pressure higher than that outside the respirator (positive pressure).

Supplied-air respiratory protection devices that use an air line have air delivered to them through a hose (the air line) from a compressor. Air quality is very important, so always let the respiratory protection staff set these up and explain their use. The following are common air line respiratory protection devices:
- supplied-air respirators (tight-fitting facepiece)
- supplied-air hoods
- supplied-air suits
- supplied-air helmets

Continued on next page
Air-Purifying vs. Air-Supplying, Continued

Air Purifying Respirators

Half-Mask

Full Face

Powered Air Purifying (PAPR)

Continued on next page
Air-Purifying vs. Air-Supplying, Continued

Air Supplied System (Respirator)

Air Supplied Hood & Air Suit

Continued on next page
Air-Purifying vs. Air-Supplying, Continued

Practice
Which kind of respirators use filters to clean up the air the wearer breathes?
A. Air-purifying
B. Air-supplying
C. Micro-climatizing
D. Self-contained

ANS: A. Air-Purifying
Air-Purifying: Application & Limitations

Objective 13
Define the general application of an air-purifying respirator, and state the limitations on its use.

Need to Know:
Applications
Applications / advantages
- Sufficient for most airborne situations,
- Easily put on and taken off,
- Good mobility

Limitations
Disadvantages of air-purifying respirators (negative pressure in particular)
- Relatively low protection factors
- They can be hot and uncomfortable
- Breathing is restricted.
- They fog easily.
- They can’t be used for IDLH atmospheres.

Practice
Some advantages of air-purifying respirators is that they can be used in immediately dangerous to life and health atmospheres (IDLH) with the right cartridges. (TRUE or FALSE) ANS: False: air-purifying respirators can never be used in an IDLH atmosphere.
Air-Supplying: Application & Limitations

Objective 14
Define the general application of an air-supplying respirator, and state the limitations on its use.

Need to Know: Application
Air-supplied respirator applications/advantages:
- The protection factor is high.
- It provides protection for both particulates and gases.
- It provides some cooling to the user.
- Hoods and suits can provide splash protection.
- Hoods and suits have increased field of vision.

Need to Know: Limitations
Air-supplied respirator limitations:
- Air lines can become tangled.
- Air line length is limited.
- They take time to set up and maintain.
- They slow work activities more than other types.
- Hoods and suits are physically restricting.
- Only the Self-Contained Breathing Apparatus can be used in IDLH atmospheres.

WARNING
Air hoods and bubble suits are very much like high-quality plastic bags that are securely attached over the user’s head. Suffocation is a danger if the air supply is halted. A designated person is required to be on standby to assist personnel in removing the hood or suit in an emergency.

Practice
A disadvantage to an air-supplying respirator (air line type) is that they are physically restricting. (TRUE or FALSE) ANS: True. The lines can limit travel and can be tangled.
Respirator Malfunctions

Objectives 15  State the immediate actions to be taken if a respirator malfunctions during its use.

Need to Know  In emergency situations, a person wearing a respirator should quit work, remove the respirator and leave the area immediately. This is a legal right of all respirator wearers.

WARNING:
When the air line supply to an atmosphere-supplying respirator fails, the user may have an immediate loss of air and not be able to breathe. If this occurs, calmly remove the air hose at the front of the respirator and leave the area.

Nice to Know  What about removing the respirator in an airborne radioactivity area? The risk of breathing in a small amount of radioactive material is a very small increase in health risk. Wearing a respirator under some emergency conditions could result in serious injury or even death.

Continued on next page
Respirator Malfunctions, Continued

Example
A worker is performing heavy work while wearing a respirator. He had to climb a ladder and walk through a congested area to get to his work site. Now the respirator lens has fogged, and he cannot see anything at all. Should he risk injury or death by “feeling” his way out of this area, or should he remove the respirator and quickly leave the area? Compare the risks and make a good decision. If at any time you believe that you have breathed in radioactive material, contact radiation protection personnel with the details.

Practice
You are working hard on a job while wearing a negative pressure, air-purifying respirator. It fogs up. You feel dizzy and light-headed. You should
A. Take your respirator off and walk out to fresh clean air
B. Try to finish the job with the respirator on. Take shallower breaths.
C. Walk out of the airborne area and then take off your respirator.
D. Ask for permission to take off your respirator

ANS: A
Maintenance & Storage

Objective 16
Describe the requirements for maintenance and storage of respirators.

Need to Know:
Airborne Radioactivity Respirators
Proper storage and cleaning of respirators are extremely important. Respirators used for airborne radioactive materials are stored and cleaned by designated personnel. The respirator wearer simply places the respirator in the appropriate container or place.

Need to Know:
Industrial Respirators
Respirators used for industrial safety purposes may be treated differently. The respirator may be assigned to a user who then becomes responsible for cleaning and maintenance. Remember that respirators must be stored so that they are protected from the following:
- damage
- contamination
- dust
- sunlight
- extreme temperatures
- excessive moisture
- damaging chemicals

When storing respirators, make sure they are stored in a way that prevents damage or deformation to the seal and exhalation valves.

Cleaning
When using respirators for industrial safety reasons, the wearer may also have to clean the respirator. Follow the procedures and policies or manufacturers recommendations provided by the utility

Practice
If you have been assigned your own respirator, you should occasionally let it set for a few hours out in the sun to kill the germs and dry it off. (TRUE or FALSE) ANS: FALSE, protect your respirator from direct sunlight which damages the rubber.
Medical Conditions & Symptoms Limiting

Objective 17  Recognize the medical conditions and symptoms that could limit or prevent the effective use of respirators

Introduction  Before putting on a respirator, consider your current health. You passed a medical exam that was based on your health at the time the exam was completed. Answer the question, “Is my health the same as it was when I passed the medical exam?”

Need to Know  Health-related conditions and symptoms that could limit or prevent your use of a respirator include:

- asthma
- cold and flu symptoms
- abnormal blood pressure
- nausea and vomiting
- heart problems
- faint or dizzy feeling
- headaches
- claustrophobia
- panic attacks

Nice to Know  There may be times when you should NOT wear a respirator. If you have doubts about your ability to use a respirator safely and effectively, check with the respiratory protection staff where you work.

Practice  You have been recently diagnosed with angina (chest pains associated with heart problems), this could affect your ability to wear a respirator. (TRUE or FALSE) ANS: True. Heart problems could limit or prevent your use of a respirator.
Relief from a Respirator

Objective 18
Describe the circumstances under which a respirator user may leave the work area for relief from respirator use.

Need to Know
Remember why you are wearing a respirator: it is to protect your health. If it is endangering you instead of protecting you, it is time to leave the area, remove the respirator, and check with respiratory protection personnel and your supervisor.

Practice
You are working on a job while wearing an airline air-supplied tight fitting respirator. Although the respirator seems to be working well, you have a cold and feel like you are going to vomit. You have the right to remove the respirator and leave the area. (TRUE or FALSE) ANS: True. You have the right to leave the area if you are endangered by the respirator.
Remove the Respirator as Exiting

Objective 19  Describe the circumstances under which the respiratory protection equipment may be removed as the respirator user exits the airborne contamination area.

Need to Know  If you are not in an immediately dangerous to life or health atmosphere and your respirator malfunctions, immediately remove your respirator and exit the airborne contamination area.

Be ready to leave in case any of the following occurs:
- communication failure
- unusual odor or taste because of chemical cartridge exhaustion
- irritation from chemicals leaked into the facepiece
- difficulty breathing from loss of air supply or filter plugging
- inhalation of extremely hot air when a chemical cartridge is exposed to high concentrations
- nausea
- dizziness
- physical or psychological distress (for example, claustrophobia)

These are indicators that the respirator is not working properly or there is another serious concern.

Nice to Know  Respirators are supposed to protect you, not endanger your life.

Practice  You are wearing a respirator with a headset. Suddenly the line goes dead. You cannot get anyone on the line. You should just wait until the communication is reestablished. (TRUE or FALSE) ANS: False. Remove your respirator and exit the airborne area.
Control Methods

Objective 20  State two control methods that must be considered prior to determining respiratory protection equipment is the best defense against an airborne hazard

Introduction  The first choice to prevent the inhalation of airborne materials should NOT be respirators. Respirators increase job duration and can add new risks. The first option should always be to prevent airborne situations.

Need to Know  The control methods that must be considered prior to determining that respiratory protection equipment is the best defense against an airborne hazard are:

- Engineering controls,
- Proper work practices, and Administrative means

Examples: Engineering Controls  Engineering controls include

- Remove radioactive materials through cleaning (decontamination) efforts.
- Use air filtration equipment (HEPA units) to remove radioactive materials from the air.
- Keep materials wet during sanding and grinding.
- Cover the radioactive materials with plastic, paint, or glue,
- Use tents or other enclosures (for example, glove bags)

Examples: Work Practices  Some common-sense work practices include

- Don’t shuffle feet or stomp while walking.
- Use materials or practices that prevent or trap dust.

Examples: Administrative  Examples of Administrative means include

- Limiting stay times and
- Coordinating activities

Continued on next page
Control Methods, Continued

Practice  Using tents or enclosures, or prejob decontamination to limit airborne is called
A. Rational control
B. Proactive control
C. Engineering control
D. Resuspension control

ANS: C
### Review of the Lesson

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<td>Describe how to perform user seal checks for respiratory protection equipment.</td>
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</tr>
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<td>Define the term “assigned protection factor.”</td>
</tr>
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</tr>
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<td>20</td>
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Instructor Materials
4. This class is presented as web-based training.

Student Materials
5. None needed beyond a computer.

Lesson References
6. California Code of Regulations, Title 8, Section 5144. Respiratory Protection
7. ACAD 00-007, Guidelines for Radiation Worker and Radiological Respiratory Protection Training, Section 3.
10. 10CFR20 subpart H - Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas
11. ANSI Standard Z88.2 - American National Standard for Respiratory Protection
12. RP1.ID3 "Respiratory Protection Program"
13. OM6.ID10 "Industrial Safety Respirator Program"

Remarks
14. This is DCPP site specific.
15. This lesson is designed for Computer/Web-based Training.
16. The information in this lesson will be evaluated by the use of a written test. (80% passing score).
Introduction

This lesson covers the Diablo Canyon site specific respiratory protection lesson.

Include the following in the introduction:

- Training goal to prepare the student with the knowledge necessary to function as a respirator wearer.
- Effectiveness measure: short term – 80% score on the site specific section of the respiratory protection examination.
Objectives

Terminal objective

There are no terminal objectives directly associated with this lesson.

Enabling objectives

The following objectives apply to the lesson.

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Airborne Hazards

Objective 1  List the airborne hazards possibly present at Diablo Canyon Power Plant.

Introduction  Diablo Canyon Power Plant (DCPP) has most of the same hazards you may have encountered at other work locations.

Need to know  The two general airborne hazards are
• Radiological
• Non-radiological

Nice to know  Non-radiological hazards include toxic gases, vapors, mists, particulates, or oxygen deficient. A list of contaminants and recommended respiratory equipment is found in OM6.ID10.

Practice  The two general types of airborne hazards encountered at Diablo Canyon are

A. Radiological and non-radiological
B. Toxic and non-toxic
C. Liquid and solid
D. Dry and powder

ANS: A, Radiological and non-radiological
Respirator Undesirable Option?

Objective 2  State why a respirator may be an undesirable option (instead of engineering controls) for airborne controls.

Need to Know  Respirators can cause a hazard to wearers just by wearing them. They can make work:
• Slower
• Hotter
• Harder to see
• Harder to communicate
• Harder to breathe

Slower work can mean the workers get more radiological dose: violating the principle of TEDE ALARA.

Need to Know: Engineering Controls  Engineering Controls means cleaning or confining potential airborne contamination. This includes tents, decontamination, plugging holes, HEPA filters on "elephant trunks."

Need to Know: TEDE ALARA  TEDE ALARA principle states that interior dose saved by wearing respirators must be balanced by the exterior dose increased by the lengthening of job in a radiation field.

Practice  Respirators are always the best means of limiting the exposure to airborne hazards (TRUE or FALSE)? ANS: False. Respirators are usually the LAST method chosen.
Requirements for a Fit Test

Objective 3  State the requirements for obtaining a fit test.

Introduction  DCPP uses a quantitative fit-test in which dust particles in the air are sampled inside the respirator and are compared with dust particles in the air outside the respirator.

A fit-test is required for each different type of respirator that is expected to be worn. During the fit-test, you will undergo activities that simulate working conditions, to ensure you will get a good fit while doing your job.

Need to Know  The radiation protection personnel who perform the fit-test will determine the size of respirator that is most likely to provide a good fit. If a good fit is NOT obtained, another size may be tried.

Before you report to the Fit Test (either in the Dosimetry Office or at Access Control):

1. You must be clean shaven (that day) on the area the masks fits upon.
2. You must refrain from smoking at least 30 minutes before reporting.
3. You must not stand around running gasoline or diesel engines for at least 30 minutes before reporting.
4. You must have your contact lenses with you (if you intend on wearing them while wearing a respirator).
5. You must have your spectacle kit with you (if you intend on wearing it while wearing a respirator).

Once a size has been determined, you will always wear that size, unless further fit-testing demonstrates the need for a different size.

Nice to Know: Contact Lens  If you are wearing contact lens during the fit test, let the technician know.

Continued on next page
Requirements for a Fit Test, Continued

Practice

Which of the following can cause you to get a bad result on a respirator fit test?
A. Exercising 20 minutes before the test.
B. Smoking 10 minutes before the test.
C. Driving your car into work an hour before the test.
D. Not shaving the day of your test.

ANS: B & D
Affecting Proper Fit

Objective 4  State what to do if you believe you should be wearing a different size respirator than the one for which you were originally fit tested.

Introduction  Normally, fit-tests are required annually. Because a fit-test ensures that the shape of your face and the respirator are a good match, things that could change the shape could be a concern.

Factors which may affect the proper fit of a tight-fitting respirator include:
- weight gain or loss
- scars in the seal area
- facial surgery
- new use of full dentures
- facial hair growth

Need to Know  If you feel as though you should wear a different size respirator, check with your supervisor so you may schedule another fit test to see what size respirator you should be wearing now. **Wear the size you were fit tested for.**

Glasses  Regular **eyeglasses** can NOT be worn inside a respirator. The temple bar would be under the respirator seal and would prevent the respirator from sealing properly. Special respirator inserts (spectacle kits) are available. The fit test is a great time to bring up any special needs such as eyeglasses. Since the kits may have to be ordered it is good to make your needs known early.

Contact Lenses  **Contact lenses** can be worn in a respirator IF they were worn during the fit-test and it was documented. Make sure to tell the person performing the fit-test that you are wearing contacts. Be warned that some respirator types will have a continuous flow of air across your face. This can result in drying to the eyes and the contacts.

Practice  You have been fit tested to wear a medium size respirator. Today you feel like a large size would fit you better. You can go ahead and wear a large until you are fit tested again. (TRUE or FALSE)? **ANS:** False, always wear the respirator size you were fit tested for.
Responsibilities

Objective 5 State whom is responsible for testing the air for radionuclide concentrations, or oxygen content, flammability toxic content in a confined space.

Introduction It is important to know whom to contact to obtain testing of the air quality.

Need to Know At DCPP the RP department will test the air for:
- radionuclide concentrations
- oxygen content, flammability, toxic content, and all other requirements for confined spaces.

Practice Your job requires you to enter an airborne radionuclide area. Whom should your supervisor contact for air sampling?
A. An industrial hygienist
B. A chemistry technician
C. A radiation protection technician
D. A safety technician

ANS: C, radiation protection technicians sample for airborne radionuclides.
Cannot Wear Negative Pressure?

Objective 6
State what DCPP must do if a physician finds a medical condition that may increase your health risk while wearing a negative pressure respirator.

Introduction
If your job requires you to be protected from airborne radionuclides or industrial gases but your medical condition does not allow you to wear a negative pressure respirator, what can you do?

Need to Know
If the respirator is a negative pressure respirator and the physician finds a medical condition that may place the employee's health at increased risk if the respirator is used, the company shall provide a powered air purifying respirator (PAPR) to the employee if such respirator can be worn. If a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the company is no longer required to provide a PAPR. (OM6.1D10)

Practice
What must DCPP provide you with if a negative pressure respirator would put your health at increased risk?
A. A Self-contained Breathing Apparatus
B. A Chemical Canister
C. A Powered Air Purifying Respirator
D. Nothing, you cannot wear a respirator

Ans: C. a PAPR
Spectacle Kit

Objective 7
State whom is responsible for purchasing special respirator glasses (spectacle kits) for those requiring them.

Need to Know:
Your employer is responsible for purchasing your spectacle kit.

Nice to Know:
To speed the process, it is helpful to have a copy of the results of a recent optical exam. Remember, you must have these prior to the fit test.

Nice to Know: Removing
When you remove your respirator, you are responsible for removing your spectacle kit from the facepiece.

Graphic: Spectacle Kit

Continued on next page
**Spectacle Kit,** Continued

**Practice**

To get a pair of special respirator glasses (spectacle kit), you must
A. Let your employer know you need them
B. Buy them yourself
C. Buy them at the DCPP Safety Store
D. Pick them up at the respirator fit station

ANS: A, let your employer know.
Wearing a Non-Required Respirator

Objective 8  
State the actions that may be taken if a worker wishes to wear a respirator when it is not required.

Introduction  
What if the work order does not call for a respirator and you think there is enough dust to warrant one? What can you do?

Need to Know  
When respirator use is not required but the employee requests a respirator, two options are available:
1. A disposable filtering facepiece (dust mask) may be issued if the employer determines that such respirator use will not in itself create a hazard. No other requirement such as medical qualification, fit testing or training is needed.

2. A non-disposable filtering facepiece may be issued if the employer determines that such respirator use will not in itself create a hazard and meets all the following conditions:
   a) The individual is medically qualified to use that respirator.
   b) The individual reads and follows all instructions provided by the manufacturer on the use, maintenance, cleaning, care and warnings regarding that respirator.
   c) The individual uses NIOSH approved respirator with canisters/cartridges certified for the contaminant of concern.
   d) The individual does not wear the respirator into atmospheres with contaminants that the respirator was not designed to protect against.
   e) The individual keeps track of the respirator so that no one else uses it and he uses only his assigned device.
   f) The individual documents, in writing and prior to using the respirator, that he has met all the conditions stated here (above).

(RP1.ID3) 

Continued on next page
Wearing a Non-Required Respirator, Continued

Need to Know: Employees shall not use their own respirators.

Practice: If a worker wants to wear a dust mask and the dust mask causes no work slow down or other hazards, may they wear one? (YES or NO) ANS: Yes
Oxygen

Objective 9  State the range of oxygen percent that is considered life supporting.

Introduction  The air that we breathe is a mixture of oxygen, argon, and nitrogen. It is important that the percentage of oxygen is regulated in some of the systems.

Need to Know:  Oxygen above 19.5% and below 23.5% is considered safe.

Below 19.5% there is not enough oxygen to breath.
Above 23.5% oxygen, the mixture becomes dangerous because of explosive hazard.

Practice  As long as the breathing air has at least 19.5% oxygen, it is OK (TRUE or FALSE)? ANS: False, it must also be below 23.5% oxygen.
Inestimable Atmospheric Hazards

Objective 10
State what the atmospheric hazard shall be considered if the employee hazard cannot be reasonably estimated or identified.

Need to Know
If the atmospheric hazard cannot be reasonably estimated or identified, the hazard shall be considered immediately dangerous to life and health (IDLH).

Definition:
Immediately dangerous to life and health (IDLH): an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Practice
If the sampled atmosphere in a confined space cannot be accurately tested, it is would be classified as:

A. Immediately dangerous to life and health
B. Red airborne
C. Yellow airborne
D. Permissive Exposure Limit Exceeded

ANS: A, IDLH
Respirators for IDLH

Objective 11  List the respirator requirements for entry into an Immediately Dangerous to Life and Health (IDLH) atmosphere.

Introduction  There are times when workers need to enter IDLH. If that is the case, they must be protected.

Need to Know  IDLH atmospheres are not to be entered by non-fire fighting personnel unless authorized by Shift Manager or industrial safety.

IDLH atmospheres require that at least one trained standby person be located outside an IDLH atmosphere.

The standby person will be in visual, voice or signal line communication with the person in the IDLH atmosphere and equipped with the following:

- A full facepiece airline pressure demand respirator with an escape bottle or SCBA with a minimum service life of 30 minutes.
- A separate air source from the person in the IDLH atmosphere.
- Appropriate retrieval equipment.

The standby person must notify the supervisor or designee prior to entering the IDLH atmosphere to provide emergency rescue.

Once the supervisor or designee is notified, the necessary assistance appropriate to the situation will be provided.

Continued on next page
Respirators for IDLH, Continued

Graphic: Escape Bottle

Practice If a worker goes into an IDLH, he needs a standby worker outside the IDLH (TRUE or FALSE)? ANS: True
Malfunctions & Emergencies

Objective 12
State the actions to take if a respirator malfunctions or the wearer encounters other emergencies.

Need to Know: Actions
The worker shall leave the respirator use area:
- To replace the respirator or the filter, cartridge, or canister elements; or
- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or
- To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use.

Need to Know: Non-IDLH
If the atmosphere is not Immediately Dangerous to Life and Health, the wearer may remove the respirator while in the area and then exit the airborne area.

Practice
You are wearing a negative pressure respirator in a radiological airborne area. You feel that it is getting hard to breathe in the respirator. You should:
A. Keep the respirator on and report it to Radiation Protection when you exit the area.
B. Take off the respirator and leave the airborne area.
C. Leave the respirator on but write a Notification to Safety when you exit.
D. Crack the sealing surface and keep working.

ANS: B, take off the respirator and leave the airborne area. Something is blocking your filters. Negative pressure respirators are not worn in an IDLH so you are safe to do this.
Equipment Used in Conjunction with Respirators

Objective 13  Describe how spectacle adapters, communication equipment, and other equipment that will be used in conjunction with the respirator are to be attached and operated properly.

Introduction  Any modification of respiratory protective equipment that is not authorized by NIOSH voids the certification.

Need to Know  Allow the RP technicians or those certified to do so put the additional equipment in and on the respirators. You may put in and take out your own spectacle kit.

Practice  An electrician needs a Clear-Com™ communication device attached to his respirator (removal of the speaker diaphragm). That would be the job of

  A. An Radiation Protection technician trained in respirators
  B. An Instrumentation Technician trained in communication devices
  C. The electrician since it is his respirator
  D. The electrician's supervisor

ANS: A. The Radiation Protection tech trained in respirators is the person who should install special parts on and in respirators.
### Issue & Return

**Objective 14**  
Describe the procedure for the issue and return of respirators.

**Need to Know:**  
**Issue**  
The worker should go to the 85’ access control or other approved location. Radiation protection personnel issue only the respiratory equipment (type and size) the worker is qualified to wear.

**Need to Know:**  
**Return**  
When the respirator usage has been completed, return it to radiation protection at access control or other designated locations.

**Nice to Know:**  
**Issue**  
RP will issue a respirator for one-time use against radionuclides inside the radiation controlled area (RCA). For use outside the RCA, painters and cement masons may be issued respirators for long-term use. Check with your supervisor.

**Nice to Know**  
The return for respirators is often a blue bag.

**Practice**  
If you are issued a respirator for use against airborne radionuclides, it will be for a one-time use (TRUE or FALSE)? ANS: True. The RP technicians will clean and sanitize the respirator right after you have worn it and dropped it off.
**Medical Conditions Limiting Use**

**Objectives 15**
Recognize the medical conditions and symptoms that could limit or prevent the effective use of respirators.

**Introduction**
Before putting on a respirator, consider your current health. You passed a medical exam that was based on your health at the time the exam was completed. Answer the question, “Is my health the same as it was when I passed the medical exam?”

**Need to Know**
Health-related conditions and symptoms that could limit or prevent your use of a respirator include:
- asthma
- cold and flu symptoms
- abnormal blood pressure
- nausea and vomiting
- heart problems
- faint or dizzy feeling
- headaches
- claustrophobia
- panic attacks

Check with the medical facility (Building 102, below the I&C shop) to get an opinion if you have doubts about your condition.

**Practice**
You have been recently had the flu (coughing, sneezing, dizziness), this could affect your ability to wear a respirator. (TRUE or FALSE) ANS: True. Cold and flu symptoms could limit or prevent your use of a respirator.
Review of the Lesson

Enabling objectives

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Evaluation

The student must pass a 15 question test on the lesson with at least an 80% score.