ANTHRAX eTool.....Protecting the Worksite against terrorism

- What is anthrax ?
- Who is at risk of anthrax exposure ?
- How should I prepare if my company has a credible risk of anthrax exposure ?
- What should I do if I have an anthrax threat at my worksite ?
- How do I clean up my worksite that has been contaminated with anthrax ?

Anthrax is an acute infectious disease caused by a spore-forming bacterium called *Bacillus anthracis*. It is generally acquired following contact with anthrax-infected animals or anthrax-contaminated animal products. Anthrax has received heightened attention recently because of its use as a biological warfare agent.

eTools are illustrated, interactive web-based training tools on occupational safety and health topics. As indicated in the disclaimer, eTools do not create new OSHA requirements. Public Test Version for comments through July 2003.

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Mail-Handling Procedures

The vast majority of companies have a very low risk of ever having an anthrax exposure. Use the following link to determine if your company has a credible risk of anthrax exposure:

- Anthrax Risk Reduction Matrix

If you determine that your company has a credible risk of anthrax exposure, the following link provides some suggested mail-handling procedures:

- Mail-Handling Procedures

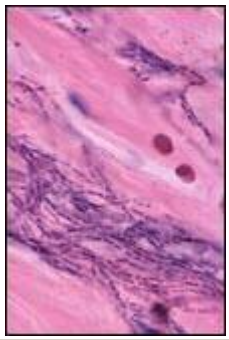
Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What is anthrax?

Anthrax is an acute infectious disease caused by a spore-forming bacterium called *Bacillus anthracis*. It is generally acquired following contact with anthrax-infected animals or anthrax-contaminated animal products. Anthrax has received heightened attention recently because of its use as a biological warfare agent.

- What is *Bacillus anthracis*?
- How can I be exposed to *Bacillus anthracis*?
- What are the symptoms of anthrax?
- What are the incidence rates of anthrax?
- How is anthrax diagnosed and treated?
- Is there a way to prevent infection?
- Links to additional information on *Bacillus anthracis* and anthrax.

What is *Bacillus anthracis*?



- *Bacillus anthracis*, the etiologic agent of anthrax, is a large, gram-positive, non-motile, spore-forming bacterial rod. The three virulence factors of *Bacillus anthracis* are edema toxin, lethal toxin, and a capsular antigen. Human anthrax has three major clinical forms: cutaneous, inhalation, and gastrointestinal.
- *Bacillus anthracis* spores do not have a characteristic appearance such as color, smell, or taste. Spores themselves are too small to be seen by the naked eye, but have been mixed with powder to transport them.

How can I be exposed to *Bacillus anthracis*?

- Anthrax infection can occur in three forms:
  - Cutaneous (skin)
  - Inhalation
  - Gastrointestinal
- *Bacillus anthracis* spores can live in soil for many years. Humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products.
- Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the United States.
- Direct person-to-person spread of anthrax is extremely unlikely to occur. Communicability is not a concern in managing or visiting with patients with inhalational anthrax.

What are the symptoms of anthrax?

Symptoms of disease vary depending on how the disease was contracted, but symptoms usually occur within 7 days.

- **Cutaneous:** Most (about 95 percent) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 centimeters in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20 percent of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

- **Inhalation:** Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is often fatal.

- **Intestinal:** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, and fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25 percent to 60 percent of cases. [Source: CDC Anthrax FAQ]

What are the incidence rates of anthrax?

As of December 5, 2001, a total of 22 cases of anthrax have been identified in the United States -- 11 were confirmed as inhalational anthrax and 11 (seven confirmed and four suspected) were cutaneous. Of the 11 cases of inhalational anthrax, direct exposure to *Bacillus anthracis*-containing envelopes was confirmed or likely in the first nine cases.

Before 2001, the incidence rates of anthrax were:

- From January 1955 to December 1999, there were 236 reported cases of anthrax, most of them cutaneous, in 30 states and the District of Columbia.

- The last case of inhalational anthrax in the United States, before 2001, was in 1976 in California. A home craftsman died of the disease. He was exposed through his work with yarn; *Bacillus anthracis* was isolated from some of the imported yarns used by the patient.

- The last case of cutaneous anthrax, before 2001, occurred in North Dakota, in 2000. It was the only case since 1992.

The case fatality rates for the various forms of anthrax are:

- **Cutaneous:** Early treatment of cutaneous anthrax is usually curative, and early treatment of all forms is important for recovery. Patients with cutaneous anthrax have reported case fatality rates of 20 percent without antibiotic treatment and less than 1 percent with it.

- **Inhalational:** Although case-fatality estimates for inhalational anthrax are based on incomplete information, the rate is extremely high, approximately 75 percent, even with all possible supportive care including appropriate antibiotics. Estimates of the impact of the delay in post-exposure prophylaxis or treatment on survival are not known.

- **Gastrointestinal:** For gastrointestinal anthrax, the case-fatality rate is estimated to be 25 percent to 60 percent. The effect of early antibiotic treatment on the case-fatality rate is not defined.

How is anthrax diagnosed and treated?

Diagnosis: Anthrax is diagnosed by isolating *Bacillus anthracis* from the blood, skin lesions, or respiratory secretions or by measuring specific antibodies in the blood of persons with suspected cases.

Treatment: Doctors can prescribe effective antibiotics. *Bacillus anthracis* usually responds effectively to several antibiotics including penicillin, doxycycline, and fluoroquinolones (such as ciprofloxacin). To be effective, treatment should be initiated early. If left untreated, the disease can be fatal.

Further information on antimicrobial treatment of anthrax can be found on the following websites:

- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Exposure Management and Antimicrobial Therapy, October 2001 [October 26, 2001 / 50(42);909-919]
- Centers for Disease Control and Prevention (CDC), Public Health Emergency Preparedness & Response, Frequently Asked Questions (FAQs) About Anthrax

Is there a way to prevent infection?

In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Also, an anthrax vaccine has been licensed for use in humans. The vaccine is reported to be 93 percent effective in protecting against anthrax.

The anthrax vaccine is a cell-free filtrate vaccine, which means it contains no dead or live bacteria in the preparation. The final product contains no more than 2.4 milligrams of aluminum hydroxide as an additive. Anthrax vaccines intended for animals should not be used in humans.

The Advisory Committee on Immunization Practices has recommend anthrax vaccination for the following groups:

- People who work directly with the organism in the laboratory,
- People who work with imported animal hides or furs in areas where standards are insufficient to prevent exposure to anthrax spores,
- People who handle potentially infected animal products in high-incidence areas (Incidence is low in the United States, but veterinarians who travel to work in other countries where incidence is higher should consider being vaccinated.), and
- Military personnel deployed to areas with high risk for exposure to the organism (as when it is used as a biological warfare weapon).
- First responders and workers involved in anthrax decontamination.

Pregnant women should be vaccinated only if absolutely necessary.

Further information on anthrax vaccination can be found on the following websites:

- The anthrax Vaccine Immunization Program in the U.S. Army Surgeon General's Office can be reached at (877)GETVACC (877)438-8222.
- Centers for Disease Control (CDC)'s Anthrax Vaccine Page

Links to additional information on *Bacillus anthracis* and anthrax

- Centers for Disease Control and Prevention (CDC), Public Health Emergency Preparedness & Response, Frequently Asked Questions (FAQs) About Anthrax
- Centers for Disease Control and Prevention (CDC), Division of Bacterial and Mycotic Diseases, Disease Information: Anthrax
- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Exposure Management and Antimicrobial Therapy, October 2001 [October 26, 2001 / 50(42);909-919]
- U.S. Army Surgeon General's Office, The anthrax Vaccine Immunization Program

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Who is at risk for anthrax exposure?

In October 2001, five workers died from inhalation anthrax and an additional 13 developed cutaneous or inhalational disease as a result of intentional terrorist activity. In most cases seen so far, the disease was linked to unexpected workplace exposures to anthrax spores contained in letters mailed through the United States Postal Service. Fortunately, the number of workplaces contaminated with the spores has also been quite limited. Nevertheless, employers and workers are concerned about possible exposure to *Bacillus anthracis* in the workplace.

Use the following link to help you decide if there is a credible risk of anthrax exposure at your worksite:

- The Anthrax Risk Reduction Matrix

The following categories of employees could potentially be exposed to anthrax:

- Workers Exposed Through Criminal/Terrorist Acts
- Emergency Response Workers
- Health Care Workers

The anthrax exposures that occurred as a result of the criminal/terrorist acts received a great deal of media attention. However, anthrax exposure is most common in animal handling and related occupations, where *Bacillus anthracis* spores can exist naturally. The following link provides more information regarding other occupations that are at-risk of anthrax exposure:

- Animal Handling and Related Occupations

Anthrax Risk Reduction Matrix

This matrix was developed to offer basic advice and suggest protective measures that OSHA believes will reduce the risk of exposure in light of current concerns about the presence of anthrax spores in the workplace. To help employers determine appropriate precautions, OSHA categorizes worksites into three risk zones - green, yellow, and red - based on the likelihood of contamination with anthrax spores.

- **Green Zone:** Workplaces where contamination with anthrax spores is unlikely

  This zone covers the vast majority of workplaces in the United States. Since October 2001, anthrax spores have been discovered only in a very limited number of workplaces. If your workplace falls into the Green Zone, it is unlikely that specific

measures to protect against anthrax exposure are necessary.

- **Yellow Zone:** Workplaces where contamination with anthrax spores is possible

  Examples of workplaces in the Yellow Zone may include:

  - Workplaces that handle bulk mail (especially, working near equipment such as high-speed processors/sorters that could aerosolize anthrax spores),
  - Workplaces that handle mail from other facilities that are known to be contaminated,
  - Workplaces in close proximity to other facilities known to be contaminated, and
  - Workplaces that may be targets of bio-terrorists.

  The following link provides additional information for workplaces that fall into the Yellow Zone:

  - How should I prepare if my company has a credible risk or anthrax exposure?

- **Red Zone:** Workplaces where authorities have informed you that contamination with anthrax spores has been confirmed or is strongly suspected

  Red Zone guidance addresses two situations:

  - Workplaces where authorities have informed you that contamination with anthrax spores has been confirmed or is strongly suspected, and
  - Sites where emergency response workers are engaged in emergency response to, and cleanup of, bio-terrorist releases of anthrax spores.

  Actions taken by an employer under these circumstances may vary depending on the specific facts and the nature of the incident. Employers should follow instructions given by law enforcement and public health agencies and convey appropriate information to employees.

  The following links provide additional information for workplaces that fall into the Red Zone:

  - What should I do if I have an anthrax threat at my worksite?
  - How do I clean up my worksite that has been contaminated with anthrax?

Workers Exposed Through Criminal/Terrorist Acts

- Workers whose jobs would not ordinarily involve anthrax exposure could be exposed through acts of terrorism.

- Conventional thinking is that terrorists are likely to target places where large populations can be found such as large buildings, sporting events, or mass transit systems.

- Recent events have shown that there is a wider range of physical locations that could be targeted and this expands the range of employees who could be exposed.

Emergency Response Workers

- Emergency responders, including police, firefighters, emergency medical services workers, and others who are responsible for responding to acts of terrorism may be exposed to anthrax.
- Health and safety precautions, including personal protective equipment (PPE) and respirators, used by emergency response workers will help protect them against anthrax exposure.

The following link will help you determine if your normal health and safety precautions will protect you or your employees against anthrax exposure during an emergency response.

- Interim Recommendations for the Selection and Use of Protective Clothing and Respirators Against Biological Agents, Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response

Health Care Workers

- Health care workers in occupational settings such as hospitals, clinics, and medical laboratories may be exposed to anthrax as a result of contact with patients whose skin, clothing, or personal effects are contaminated with anthrax spores, or through contact with contaminated equipment.
- Anthrax is not a contagious disease.
- Because the most likely exposure route for health care workers is dermal contact, normal health and safety precautions (such as wearing latex/nitrile examination gloves) will protect these workers against cutaneous anthrax exposure.

The following links will provide additional emergency response information for health care workers:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Hospitals and Community Emergency Response -- What You Need to Know, OSHA 3152, 1997
- Anthrax Page for Lab and Health Professionals. CDC Public Health Emergency Preparedness and Response (2002)

Animal-Handling Occupations

- Anthrax is most common in occupations involving animals, animal hides, or fibers. Grazing animals such as cattle, sheep, goats, and horses are chief animal hosts of anthrax.
- Occupations susceptible to exposure include shepherds, farmers, butchers, handlers of imported hides or fibers, weavers, veterinarians, and veterinary pathologists.
- Anthrax can be found globally. However, it is more common in developing countries or countries without veterinary public health programs.

Employers in animal-handling occupations who anticipate exposure may find the following information useful:

- Anthrax, Veterinary Services, USDA 10/2001

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

How should I prepare if my company has a credible risk of anthrax exposure?

The following information will help you prepare for potential emergencies if you determine that your facility fits into the Yellow or Red Zones on the Anthrax Risk Reduction Matrix (such as if your facility has a credible risk of anthrax exposure):

- Emergency Action Plan
- Mail-Handling Procedures

Emergency Action Plan

An emergency action plan (EAP) describes the actions employees should take to ensure their safety if a fire or other emergency situation occurs. Well-developed emergency plans and proper employee training (such that employees understand their roles and responsibilities within the plan) will result in fewer and less severe employee injuries and less structural damage to the facility during emergencies. A poorly prepared plan is likely to lead to a disorganized evacuation or emergency response, resulting in confusion, injury, and property damage. If your facility fits into the Yellow Zone on the Anthrax Risk Reduction Matrix (such as if your facility has a credible risk of anthrax exposure), you should add anthrax-specific information to your EAP. This may include:

- **Emergency identification:** Provide guidance on how to recognize a potential emergency situation (such as an anthrax threat or release, suspicious mail, etc.).
- **Initial actions:** Upon identification of a potential anthrax threat or release:
  - Do not panic.
  - Isolate contaminated areas.
  - Minimize exposure to others.
  - Turn off local fans or ventilation units and shut down the air handling system in the building, if possible.
  - Keep track of people who may have come into contact with the anthrax. Give this list to both the local public health authorities and law enforcement officials.
- **Notify the proper authorities** once the area has been isolated.
  - Call **9-1-1** for local fire and law enforcement assistance. Call the Federal Protective Service if your building is managed by GSA.

- Notify the **National Response Center at (800)424-8802**. The NRC will notify the appropriate parties responsible for aiding in mitigation of these events.
- Contact the owner or operator of the facility.

- **Notification:** A description of the alarm system to be used to notify employees (including disabled employees) to evacuate and/or take other actions.
- **Evacuation policy:** An evacuation policy, procedures, and escape route assignments so employees understand who is authorized to order an evacuation, under what conditions an evacuation would be necessary, how to evacuate, and what routes to take.
- **Account for employees:** Procedures to account for employees after the evacuation to ensure that everyone got out.
- **Organizational structure:** Define an organizational structure that defines the roles and responsibilities of employees in the event of an emergency.
- **Employee training:** A description of how employees will be informed of the contents of the plan and trained in their roles and responsibilities.
- **Contact information:** The names, titles, departments, and phone numbers of employees who can be contacted for additional information or clarification of some aspect of the plan.
- **Off-hour contacts:** A list of key personnel who should be contacted during off-hours emergencies.
- **Emergency drills:** Conduct emergency drills to help ensure that the actions outlined in the EAP are carried out properly and safely.

The following eTool link provides information on how to write and implement an EAP (including OSHA's Expert System, which will help you write your own EAP):

- U.S. Department of Labor, Occupational Safety and Health Administration, Evacuation Plans and Procedures eTool.

Mail-Handling Procedures

In light of the terrorist attacks involving anthrax being transported through mail and packages, mail handling has become a concern for many employees and facilities. If your facility fits into the Yellow Zone of the Anthrax Risk Reduction Matrix (your facility has a credible risk of anthrax exposure), the following mail handling information may be useful:

- Centers for Disease Control and Prevention (CDC) Health Advisory, *Updated Information About How To Recognize and Handle a Suspicious Package or Envelope*, Distributed via the Health Alert Network October 31, 2001, CDCHAN-00050-01-10-31-ADV-N.
- Federal Bureau of Investigation (FBI) Advisory Poster, *If you receive a suspicious letter or package, what should you do?*, General Information Bulletin 2000-3.
- United States Postal Service, Mail Center Security Website.
- Public Health Foundation, Bioterrorism/Emergency Preparedness, **Video:** Protecting Your Health for People Who Process, Sort, and Deliver the Mail

Upon discovery of a suspicious package, the facility's Emergency Action Plan should be implemented.

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What should I do if I have an anthrax threat at my worksite?

The actions that will constitute an appropriate response for an anthrax threat will depend on how the threat was discovered and the credibility of a threat at your facility (for example, which zone your facility fits into on the Anthrax Risk Reduction Matrix).

- Discovery of Possible Contamination or Threat
- Evaluate the Credibility of the Threat
- Determine What Actions You Should Take

Discovery of Possible Contamination or Threat

Discovery of anthrax may occur in several ways:

- Physical evidence (such as a suspicious package containing powder),
- Epidemiological or medical observations (such as individual cases of anthrax), or
- Unsubstantiated threat (such as a phone call or letter stating that anthrax has been used).

The following links provide additional information about identifying suspicious packages:

- Centers for Disease Control and Prevention (CDC) Health Advisory, *Updated Information About How To Recognize and Handle a Suspicious Package or Envelope*, Distributed via the Health Alert Network October 31, 2001, CDCHAN-00050-01-10-31-ADV-N.
- Federal Bureau of Investigation (FBI) Advisory Poster, *If you receive a suspicious letter or package, what should you do?*, General Information Bulletin 2000-3.
- United States Postal Service, Mail Center Security Website.
- Public Health Foundation, Bioterrorism/Emergency Preparedness, **Video:** Protecting Your Health for People Who Process, Sort and Deliver the Mail

Evaluate the Credibility of the Threat

The first step to take for a potential anthrax threat is to evaluate the credibility of the threat. This is done by evaluating where your facility fits on the Anthrax Risk Reduction Matrix. The actions you should take if you have an anthrax threat at your worksite will depend on your zone.

- Evaluate your facility using the Anthrax Risk Reduction Matrix.

Determine What Actions You Should Take

After you have determined which zone your facility fits into on the Anthrax Risk Reduction Matrix, the following table will help you determine what actions to take if you have an anthrax threat at your worksite.

Roll over the color boxes below (green, yellow, red) to see corresponding response actions. (This rollover effect will only work in Internet Explorer. For a version that works in Netscape Navigator, click here.)

Nature of the Anthrax Threat	Response Actions		
	Green Zone **A credible anthrax threat is unlikely at your facility.**	**Yellow Zone** **A credible anthrax threat is possible at your facility.**	**Red Zone** **Anthrax is strongly suspected or has been confirmed at your facility. The appropriate authorities should already be involved in the the anthrax mitigation efforts.**
Physical evidence (such as a suspicious package containing powder)			
Epidemiological or medical observations (such as individual cases of anthrax)			
Threat (such as a phone call or letter stating that anthrax has been used)			

Click the color boxes below (green, yellow, red) to see corresponding response actions.

Nature of the Anthrax Threat	Response Actions		
	Green Zone A credible anthrax threat is unlikely at your facility.	**Yellow Zone** A credible anthrax threat is possible at your facility.	**Red Zone** Anthrax is strongly suspected or has been confirmed at your facility. The appropriate authorities should already be involved in the the anthrax mitigation efforts.
Physical evidence (such as a suspicious package containing powder)	1. Determine if there is a logical explanation for the "physical evidence" (e.g. suspicious package or powder). Some examples may include: ④ If you receive a suspicious package, try to identify who sent it and call them to ask about it. ④ If you find suspicious powder, try to determine if the powder came from a logical source (e.g. powdered soap dispenser, spilled baking soda box, construction debris, etc.). 2. If you determine that the "physical evidence" came from a logical source and it is not suspicious, it is unlikely that anthrax is present.		
Epidemiological or medical observations (such as individual cases of anthrax)	1. If one or more employees are exhibiting symptoms of anthrax: ④ Encourage them to see a health care professional to evaluate the cause of the symptoms. ④ Many of the anthrax symptoms are similar to common illnesses, such as the flu, and can cause unnecessary distress in the workplace. 2. If no confirmed cases of anthrax are discovered, it is unlikely that a credible threat of anthrax exposure exists at your worksite.		
Threat (such as a phone call or letter stating that anthrax has been used)	1. Call 9-1-1 and report the threat. An anthrax threat is a criminal act, regardless if the threat is credible or not.		

Click the color boxes below (green, yellow, red) to see corresponding response actions.

Nature of the Anthrax Threat	Response Actions		
	Green Zone A credible anthrax threat is unlikely at your facility.	**Yellow Zone** A credible anthrax threat is possible at your facility.	**Red Zone** Anthrax is strongly suspected or has been confirmed at your facility. The appropriate authorities should already be involved in the the anthrax mitigation efforts.
Physical evidence (such as a suspicious package containing powder)	1. Determine if there is a logical explanation for the "physical evidence" (e.g. suspicious package or powder). Some examples may include: • If you receive a suspicious package, try to identify who sent it and call them to ask about it. • If you find suspicious powder, try to determine if the powder came from a logical source (e.g. powdered soap dispenser, spilled baking soda box, construction debris, etc.). 2. If you determine that the "physical evidence" came from a logical source and it is not suspicious, it is unlikely that anthrax is present. **or** If you cannot find a logical explanation for the "physical evidence:" • Initiate your Emergency Action Plan (EAP).		
Epidemiological or medical observations (such as individual cases of anthrax)	1. If one or more employees are exhibiting symptoms of anthrax: • Encourage them to see a health care professional to evaluate the cause of the symptoms. • Many of the anthrax symptoms are similar to common illnesses, such as the flu, and can cause unnecessary distress in the workplace. 2. If no confirmed cases of anthrax are discovered, it is unlikely that a credible threat of anthrax exposure exists at your worksite. **or** If a confirmed case of anthrax is discovered at your worksite: • Notify your local health department. Call 9-1-1 if you are unsure who to contact. • Follow the directions of the health department and help them determine if your workplace may have been the source of the exposure.		
Threat (such as a phone call or letter stating that anthrax has been	1. Call 9-1-1 and report the threat. An anthrax threat is a criminal act, regardless if the threat is credible or not. 2. Notify your employees of the threat. Inform them to be cautious of		

used)	suspicious mail/packages and to report any potential anthrax found in the workplace. 3. If physical evidence is discovered, initiate your Emergency Action Plan (EAP).

Click the color boxes below (green, yellow, red) to see corresponding response actions.

Nature of the Anthrax Threat	Response Actions		
	Green Zone A credible anthrax threat is unlikely at your facility.	**Yellow Zone** A credible anthrax threat is possible at your facility.	**Red Zone** Anthrax is strongly suspected or has been confirmed at your facility. The appropriate authorities should already be involved in the the anthrax mitigation efforts.
Physical evidence (such as a suspicious package containing powder)	1. Notify the authorities overseeing mitigation of anthrax at your facility. If authorities aren't involved yet, call 9-1-1 and report the threat. 2. Initiate your Emergency Action Plan (EAP), or continue EAP activities if already underway.		
Epidemiological or medical observations (such as individual cases of anthrax)	1. Notify the authorities overseeing mitigation of anthrax at your facility. If authorities aren't involved yet, call 9-1-1 and report the threat. 2. Follow the directions of the authorities overseeing mitigation to help them identify all persons who might have been exposed to anthrax.		
Threat (such as a phone call or letter stating that anthrax has been used)	1. Notify the authorities overseeing mitigation of anthrax at your facility. The threat may help them identify the source of the anthrax if not already identified. If authorities aren't involved yet, call 9-1-1 and report the threat.		

How do I clean up my worksite that has been contaminated with anthrax?

The following pages were developed as a technical resource specifically for response to a release of anthrax. The purpose of these pages is to help protect public health and safety by providing the most current information available throughout the federal government, and sharing national experience to date in responding to releases of *Bacillus anthracis* in urban environments.

- **What first response actions should be taken?** This section describes activities during the initial or emergency phase (generally the first 24-48 hours) of a response to a suspected incident involving anthrax. It is intended for personnel who discover the potential contamination and for first responders on the scene.

- **What Health and Safety Plan (HASP) requirements exist at anthrax contaminated sites?** This section describes the Health and Safety Plan requirements as they apply to response activities related to an anthrax release.

- **What training requirements exist for workers involved in anthrax response and remediation?** This section describes the training that is required to provide response workers and other potentially affected persons the hazard awareness training they need to work safely.

- **What types of personal protective equipment (PPE) are necessary?** This section describes the Personal Protective Equipment (PPE) necessary to shield or isolate workers from health and safety hazards in the workplace. In a site where anthrax spores may be present, PPE protects workers from exposure to respiratory and skin hazards and prevents the spread of contaminants to uncontaminated areas.

- **What are the employee medical program requirements?** This section describes the Medical Surveillance Program requirements for response activities related to an anthrax release.

- **How do I sample and analyze for anthrax?** This section describes sampling methodologies for anthrax releases and analytical methods for detection of anthrax.

- **How should I decontaminate during response actions?** This section provides information on decontaminating buildings or specific areas, systems, or items within buildings after an actual release of anthrax.

- **What is a Transition Program and what elements should I include in my Transition Program?** This section describes the Transitional Program requirements for facilities in which anthrax contamination has been identified, response actions have been completed, and normal work operations will be conducted.

- **Links to Additional Anthrax Response Information** This web page contains links to references and additional information for each of the sections above.

What first response actions should be taken?

This page describes activities during the initial or emergency phase (generally the first 24-48 hours) of a response to a suspected incident involving anthrax. It is intended for personnel who discover the potential contamination and for first responders on the scene.

- Notification and Initial Actions
- Lead Agencies and Incident Command System/Unified Command
- Preliminary Assessment to Determine Credible Threat
- Site Assessment to Verify Contamination
- Identification of Potentially Exposed Personnel

Notification and Initial Actions

As soon as a initial anthrax contamination is confirmed:

- Call **9-1-1** for local police assistance and the local Federal Bureau of Investigation (FBI).
  Federal agencies located in buildings managed by GSA should contact the Federal Protective Service.
- Notify the **National Response Center (NRC) at (800)424-8802**. The NRC will notify appropriate agencies, such as the Environmental Protection Agency (EPA), FBI, United Stated Coast Guard (USCG), and Centers for Disease Control and Prevention (CDC), to arrange needed assistance.
- Contact the owner or operator of the facility.
- Direct occupants of the facility to report to a designated meeting place, as identified in the local facility response plan.

Immediately dial 9-1-1 if you have a confirmed anthrax attack.

Lead Agencies and Incident Command System/Unified Command

The lead agencies responding to a suspected incident will coordinate their efforts under a Unified Command (UC) within an Incident Command System (ICS) to ensure their actions and resources are integrated into a single, effective response. The UC for anthrax response will usually include:

- FBI
- Federal On-scene Coordinator (such as the EPA, USCG)
- State On-scene Coordinator and/or local Incident

Commander(s) (such as the local police, fire department, or public health official)

- Facility manager or property owner

Preliminary Assessment to Determine Credible Threat

Initial efforts should be made to assess the situation and determine whether the incident poses a credible threat. The assessment may begin with a conference call with the reporting party and involved agencies, such as the FBI, EPA, USCG, CDC, and appropriate local health and law enforcement authorities. If the report appears to be credible, the FBI and other responding agencies will coordinate a site assessment to confirm the threat.

Site Assessment to Verify Contamination

The objectives of the Site Assessment sampling may include any of the following:

- **Determine qualitatively whether any spores are present.** Typically, composite samples of large areas and air volumes are obtained to maximize the likelihood of finding contamination.

- **Identification of Spores in a Bulk Material (such as powder in an envelope)** On-site analysis may be used for preliminary assessment to determine qualitatively if a bulk material is contaminated with anthrax.

- **Determination of Contamination of an Article** Composite surface samples of large articles and individual samples of small articles are collected to determine whether the article's surface is contaminated.

Vacuums such as this are used to sample large volumes of air.

Identification of Potentially Exposed Personnel

As quickly as possible, facility managers and first responders should identify personnel who might have been exposed, including:

- People in the area where the spores were released,

- People who may have handled contaminated items or packages, and

- Response personnel.

Potential sources of data include:

- Employee timecards,
- Visitor logs, and
- Security videotapes.

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What Health and Safety Plan (HASP) requirements exist for anthrax-contaminated sites?

For cleanup operations, OSHA's *Hazardous Waste Operations and Emergency Response (HAZWOPER)* standard (29 *CFR* 1910.120) requires a written health and safety plan (HASP), which identifies site hazards and appropriate controls to protect employee health and safety. The elements of the HASP are described in the standard and include the following:

- Organizational Structure
- Site Characterization and Job Hazard Analysis
- Site Control
- Training
- Medical Surveillance
- Personal Protective Equipment
- Exposure Monitoring
- Temperature Extremes
- Spill Containment
- Decontamination
- Emergency Response
- Standard Operating Procedures

Due to overlap of some of the elements, it may be useful to expand the HASP to include those elements necessary to protect the local community and environment (for example, disposal of waste from decontamination, monitoring community exposures to fumigants).

Organizational Structure

The organizational structure part of the program shall establish the specific chain of command and specify the overall responsibilities of supervisors and employees. It shall include, at a minimum, the following elements:

- A general supervisor who has the responsibility and authority to direct all hazardous waste operations.
- A site safety and health supervisor who has the responsibility and authority to develop and implement the HASP and verify compliance.
- All other personnel needed for hazardous waste site operations and emergency response and their general functions and responsibilities.
- The lines of authority, responsibility, and communication.

The organizational structure shall be reviewed and updated as necessary to reflect the current status of waste site operations. It is necessary to organize and assign personnel roles, responsibilities, lines of authority, and communication before an anthrax-related event to ensure an efficient and safe response.

For more detailed information regarding specific roles associated with an emergency response, go to the Anthrax eTool Training page.

Site Characterization and Job Hazard Analysis

The HASP requires a characterization of the site-specific job hazards, including:

- Location and approximate size of the site,
- Description of the response activity and the job task to be performed,
- Duration of the planned employee activity,
- Site topography and accessibility by air and roads,
- Safety and health hazards expected at the site (for example, chemical, physical, biological hazards),
- Pathways for hazardous substance spread, and
- Present status and capabilities of emergency response teams that would provide assistance to hazardous waste cleanup site employees at the time of an emergency.

The following links provide additional information regarding site characterization and job hazard analysis:

- Anthrax eTool: Who is at risk of anthrax exposure?
- OSHA's *Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard* 29 *CFR* 1910.120

Site Control

In the event of an anthrax release, it is necessary to control site access in order to prevent exposure and spread of the anthrax spores. Suggested site controls include:

- Evacuate and secure the area,
- Turn off fans and air handling systems, if possible, and
- Notify personnel about the potential hazard and to not access the area. The impacted area should only be accessed by those trained and informed about the release.

As outlined in the HAZWOPER (29 *CFR* 1910.120), a site control program for protecting employees should be part of the employer's HASP and should include, at a minimum, the following:

- Site map,
- Site work zones,
- Use of a "buddy system,"
- Site communications including alerting means for emergencies,
- Standard Operating Procedures (SOPs) or safe work practices, and

- Identification of the nearest medical assistance.

Training

A site-specific training program ensures that workers receive the hazard awareness training they need to work safely. Training should be based on the job hazard analysis in the HASP and other applicable standards.

Anthrax-specific hazard awareness training should help workers understand the health hazards of anthrax and how to protect themselves from exposure to spores. Specific topics might include:

- How workers might be exposed to spores, the signs and symptoms of infection, and medical conditions that could place them at increased risk (such as a compromised immune system),
- Where contamination has been identified in the facility, and the status of decontamination of those areas, and
- How to minimize the risk of disease through specific standard operating procedures and controls (such as engineering controls, work practices, housekeeping, or PPE), and whether specific measures are expected to be temporary or permanent.

49 *CFR* Part 172, Subpart H provides additional training requirements for workers preparing contaminated materials or other hazardous materials for transport. For the most current version of 49 CFR, visit the: *Code of Federal Regulations* website.

Additional training information is provided on the Anthrax eTool Training page.

Medical Surveillance

The purpose of medical surveillance in the workplace is to improve the effectiveness of the occupational health and safety program by systematically collecting and analyzing information that pertains to at-risk workers.

Medical screening is the use of examinations or tests to detect adverse effects on a worker's health at an early stage when prevention is possible or treatment is most effective.

- **Baseline medical screening** should identify pre-existing conditions that may affect an individual worker's fitness for duty.
- When it is no longer necessary for a worker to re-enter a contaminated site, a **final evaluation** should be done to identify changes from the baseline and any new risk factors.

Further information about Medical Surveillance may be found at the following websites:

- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Notice to Readers: Occupational Health Guidelines for Remediation Workers at Bacillus anthracis-Contaminated Sites [September 6, 2002 / 51(35);786-789]

Personal Protective Equipment

Personal protective equipment (PPE) shields or isolates workers from health and safety hazards in the workplace. In a site where anthrax spores may be present, PPE protects workers from exposure to respiratory and skin hazards and prevents the spread of contaminants to uncontaminated areas. The level and type of PPE should be based on the job hazard analysis in the HASP. Workers should be trained on the location, type, and proper use of the PPE.

Further information about PPE may be found at the following websites:

- OSHA's PPE Safety and Health Topics page

Exposure Monitoring

For exposure monitoring, the HASP should include the following three major components:

- Medical measures to prevent anthrax,
- Medical screening and follow-up care for anthrax and medical complications related to preventive measures, and
- Knowledge and information that workers need to prevent anthrax and medical complications related to preventive measures.

Temperature Extremes

Heat Stress: Temperature extremes can adversely affect worker health and safety. Heat stress can be experienced by workers due to hot ambient temperatures. In addition, the use of PPE, especially in excess, can increase the chance a worker will experience heat stress. The four main types of heat stress are listed below:

- **Heat Rash:** Caused by continuous exposure to heat and humid air and aggravated by chafing clothing. Decreases ability to tolerate heat, as well as being a nuisance.
- **Heat Cramps:** Caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs are muscle spasms and pain in the extremities and abdomen.
- **Heat Exhaustion:** Caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness and physical or mental exhaustion.
- **Heat Stroke:** The most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma. Medical help must be obtained immediately.

Cold Stress: Cold stress can be experienced by workers when they are exposed to a cold environment. The two main types of cold stress are listed below:

- **Frostbite:** Local injury resulting from cold is included in the generic term frostbite. There are

several degrees of damage. Frostbite of the extremities can be categorized into:

1. *Frost nip or incident frostbite* - the condition is characterized by sudden blanching or whitening of skin.

2. *Superficial frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

3. *Deep frostbite* - tissues are cold, pale and solid; extremely serious injury.

- **Hypothermia:** There are degrees of hypothermia which are characterized as "moderate" and "severe." A victim of moderate hypothermia exhibiting the first seven signs listed below is still conscious but often confused. Severe hypothermia is determined by extreme skin coldness, loss of consciousness, faint pulse, and shallow, infrequent, or apparently absent respiration. Death is the ultimate result.

1. Severe shivering

2. Abnormal behavior

3. Slowing

4. Stumbling

5. Weakness

6. Inability to walk

7. Collapse

8. Stupor

9. Unconsciousness

Spill Containment

To prevent further spread of the anthrax spores:

- Evacuate and secure the area.
- Turn off the air handling systems, if possible.
- Notify personnel to stay away from the site. Only those trained and informed about the release should access the impacted area.

Decontamination

Cleaning an area or item contaminated by anthrax involves numerous and variable issues that are specific to individual locations. No single technology, process, or strategy will be effective in every case. Responders must develop a decontamination plan that takes into account the:

- Nature of the contamination.
- Extent of the contamination.
- Objectives of decontamination.

The extent of contamination and how the contamination was spread are critical considerations in isolating affected areas and selecting appropriate decontamination technologies.

Emergency Response

Notify the agencies below. Keep the contact numbers easily accessible.

- Call **9-1-1** for local police assistance and the local Federal Bureau of Investigations (FBI).
- Call the **National Response Center (NRC) at (800)424-8802**. The NRC will notify the appropriate agencies.

An emergency response protocol should be contained in the HASP for site personnel to follow while waiting and preparing for the notified agencies to arrive, initial actions should focus on the following:

- Isolate contaminated areas,
- Minimize exposure to others, and
- Keep track of those who may have been exposed.

Standard Operating Procedures

Developing standard operating procedures (SOPs) provides a guideline for personnel to perform work activities as well as proper response as outlined in the HASP. Easily accessible SOPs can prevent mistakes and incorrect protocol, and therefore result in a safer workplace. Procedures directly related to an anthrax-related threat that may be included in the SOPs are:

- Notification procedures
- Containment of the impacted area
- Threat assessment
- Evacuation procedures

Additional information about evacuation procedures can be found in OSHA's Evacuation Plans and Procedures eTool.

Occupational Safety & Health Administration
200 Constitution Avenue, NW

What training requirements exist for workers involved in anthrax response and remediation?

A site-specific training program ensures that workers receive the hazard awareness training they need to work safely. The level of training required will depend on the types of activities that workers are performing. For anthrax response and remediation activities, training requirements are categorized as follows:

- Emergency Response
- Cleanup Operations
- Post-Emergency Cleanup
- Appropriate Safety and Health Training
- Anthrax-Specific Hazard Awareness Training
- Additional Training Information

Emergency Response

The five levels of training for employees who initially respond to an emergency are listed from the lowest to highest level of competency below:

- **First Responder awareness level:** First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release.

- **First Responder operations level:** First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures.

- **Hazardous Materials Technician:** Hazardous

materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

- **Hazardous Materials Specialist:** Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of hazardous materials technicians. However, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities in regards to site activities.

- **On-scene Incident Commander:** Incident commanders will assume control of the incident scene beyond the first responder awareness level.

Each level requires employers to have sufficient training or to have sufficient experience to objectively demonstrate competencies listed in 29 *CFR* 1910.120(q)(6). Certification of training is required.

Cleanup Operations

At sites where OSHA's HAZWOPER standard applies, the safety and health training program should be based on the job hazard analysis in the Health and Safety Plan (HASP) and other relevant OSHA requirements. The training elements required by HAZWOPER include:

- Initial anthrax hazard awareness training for site workers and supervisors,
- Exceptions to initial training requirements,
- Site-specific anthrax hazard awareness briefings for visitors and workers,
- Refresher training,
- Qualification of trainers,

- Training certification, and
- Emergency response training.

All employees who work on a HAZWOPER cleanup site (not limited to cleanup crew) where they are exposed to hazardous substances, health hazards, or safety hazards, must have training that meets the requirement of 29 *CFR* 1910.120(e) or have equivalent experience and/or training. The four levels of training for employees who work on cleanup operations are listed below:

- General site workers,
- Workers on site only occasionally for a specific limited task (unlikely to be exposed over limits and not required to wear respirators),
- Workers regularly on site in monitored and fully characterized task areas (unlikely to be exposed over limits and not required to wear respirators), and
- Managers and supervisors.

Each level requires employees to have sufficient training or to have equivalent experience. Certification of training is required. The required elements of training are:

- Names of personnel and alternates responsible for site safety and health,
- Safety, health, and other hazards present on the site,
- Use of personal protective equipment (PPE),
- Work practices by which the employer can minimize risks from hazards,
- Safe use of engineering controls and equipment on the site,
- Medical surveillance requirements including recognition of the symptoms and signs that might indicate exposure to hazards,
- Contents of the site safety and health plan including:
  - Decontamination procedures in accordance with 29 *CFR* 1910.120(k),
  - An emergency response plan meeting the requirements of 29 *CFR* 1910.120(l) for safe and effective responses to emergencies including the necessary PPE and other equipment,
  - Confined space entry procedures, and
  - A spill containment program meeting the requirements of 29 *CFR* 1910.120(j).

Post-Emergency Cleanup

Where the cleanup is done on plant property using plant or workplace employees, these employees must have completed the training requirements of the following:

- Emergency action plan 29 *CFR* 1910.38(a),
- Respiratory protection 29 *CFR* 1910.134,
- Hazard communication 29 *CFR* 1910.1200, and
- Other appropriate safety and health training made necessary by the tasks that are expected to be performed (such as PPE and decontamination procedures).

Appropriate Safety and Health Training

A site-specific training program ensures that workers receive the training they need to work safely. Workers must receive all training required by applicable OSHA standards. This training may be included in the HAZWOPER curriculum. Examples of relevant training required by other standards include:

- Hazard communication
- PPE
- Respiratory protection
- Fire extinguisher
- Emergency action plan
- Fire prevention plan
- Emergency response
- Lockout/tagout
- Observing working surfaces
- Noise

Anthrax-Specific Hazard Awareness Training

Anthrax-specific hazard awareness training should help workers understand the health hazards of anthrax and how to protect themselves from exposure to spores. Specific topics might include:

- How workers might be exposed to spores, the signs and symptoms of infection, and medical conditions that could place them at increased risk (such as compromised immune systems),
- Where contamination has been identified in the facility, and the status of decontamination of those areas, and
- How to minimize the risk of disease through specific standard operating procedures and controls (such as engineering controls, work practices, housekeeping, or PPE), and whether specific measures are expected to be temporary or permanent.

There are additional training requirements for workers preparing contaminated materials or other hazardous materials for transportation to a treatment or disposal facility. These requirements can be found in the federal hazardous materials transportation regulations at 49 *CFR* Part 172, Subpart H.

Additional Training Information

- *Code of Federal Regulations* website
- Hazardous Waste Operations and Emergency Response (HAZWOPER), 29 *CFR* 1910.120 [July 1, 2002] (the most current revision available at the time of this website's creation)

- Transportation Training, 49 *CFR* 172, Subpart H [October 1, 2001] (the most current revision available at the time of this website's creation)

- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Notice to Readers: Occupational Health Guidelines for Remediation Workers at Bacillus anthracis-Contaminated Sites [September 6, 2002 / 51(35);786-789]

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What types of Personal Protective Equipment (PPE) are necessary?

Personal protective equipment (PPE) shields or isolates workers from health and safety hazards in the workplace. In a site where anthrax spores may be present, PPE protects workers from exposure to respiratory and skin hazards and prevents the spread of contaminants to uncontaminated areas.

- Skin Protection
- Respiratory Protection
- PPE Training

Skin Protection

Wearing protective clothing protects the skin and can prevent the transfer of contamination off-site. The appropriate level of skin protection, which should be outlined in the HASP, is determined based on the site conditions. The appropriate level of skin protection used at an anthrax-impacted site should include, at a minimum, the following:

- Tyvek or equivalent coveralls
- Unpowdered disposable gloves made of lightweight nitrile or vinyl

Appropriate PPE selection will take into account the following:

- Does it protect the skin from contact with anthrax spores?
- Does it protect the worker form contact with chemicals used in the response?
- Does it protect the worker from other site hazards identified in the HASP?
- Can it can be taken off safely and left at the site to prevent the transfer of contamination off-site.

The following links include more detailed information on Skin Protection:

- OSHA's PPE Technical Links page

- OSHA Standard 29 *CFR* 1910 Subpart I, *Personal Protective Equipment*

Respiratory Protection

Since airborne spores generally pose the greatest threat to personnel, respiratory protection is a necessary component of the PPE program. The OSHA respiratory protection standard (29 *CFR* 1910.134) requires you to establish and comply with an effective respiratory program. Program requirements include:

- Program administration;
- Worksite-specific procedures, respirator selection, employee training, fit testing;
- Medical evaluation; and
- Respirator use, cleaning, maintenance, and repair.

To date, experience has shown the following to provide adequate protection for most response, sampling, and decontamination activities involving spores:

- Powered air-purifying respirators (PAPRs) with P100 filters, or
- Full-face negative pressure air purifying respirators (APRs) with N95 filters.

Some emergency response operations may require that first responders wear the following with their normal Hazardous Material response ensembles:

- Self-Contained Breathing Apparatus (SCBA).

The following links include more detailed information on Respiratory Protection:

- OSHA's Respiratory Protection Technical Links page
- OSHA's PPE Technical Links page
- OSHA Standard 29 *CFR* 1910.134, *Respiratory Protection*

PPE Training

It is essential that personnel be trained on the proper use of PPE to ensure they receive greatest protection possible. Employers should certify in writing that the training has been provided and that employees understand what they need to know about PPE. The certification should show the name of each employee trained and the dates and types of training provided.

Workers should be trained to know:

- When PPE is necessary
- What type of PPE to use
- Where the PPE is located
- How the PPE should be worn

- What the PPE limitations are
- How long the PPE is likely to last
- How to properly maintain and dispose of the PPE

In addition, appropriate personnel decontamination and contamination containment procedures are needed for workers using PPE to prevent exposure to anthrax. In general, these procedures are similar to those for asbestos abatement and include:

- Isolating contaminated areas
- Negative-pressure ventilation
- A three- to five-stage decontamination line with a shower for equipment and personnel
- Appropriate waste disposal

For additional detailed information about Respiratory Protection see the following:

- OSHA's Respiratory Protection Technical Links page
- OSHA's PPE Technical Links page
- Anthrax eTool Training Page
- EPA's publication "*Guidance for Controlling Asbestos-Containing Materials in Buildings*"; EPA-560/5-85-024 (Purple Book)
- OSHA's *Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard 29 CFR* 1910.120
- OSHA Standard 29 *CFR* 1910 Subpart I, *Personal Protective Equipment*

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What are the employee medical program requirements?

Because of the potential for exposure to anthrax, medical measures to prevent anthrax must be taken. The medical measures differ depending on the type of worker and duration of exposure. There are three types or categories of workers or others who may be exposed to anthrax:

- Short-Term Response Workers
- Long-Term Response Workers
- Occupants, Workers, or Visitors at a Site Contaminated with Anthrax

In addition to the medical measures to prevent exposure to anthrax, and the medical surveillance programs required in the HAZWOPER (29 *CFR* 1910.120) and respiratory protection regulations, the occupational health and safety plan (HASP) should also include the following two major components to protect workers:

- Medical Screening and Follow-Up Care for Anthrax and Medical Complications Related to Preventive Measures
- Knowledge and Information that Workers Need to Prevent Anthrax and Medical Complications Related to Preventive Measures

Additional information regarding medical surveillance can be found at the following site:

- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Notice to Readers: Occupational Health Guidelines for Remediation Workers at Bacillus anthracis-Contaminated Sites [September 6, 2002 / 51(35);786-789]

Short-Term Response Workers

Exposures are limited to a single episode or a few episodes within a brief period (less that 30 days). Local emergency medical personnel, police, and firefighters who are not expected to re-enter contaminated areas for longer periods of time fall into this category.

Short-term response workers should be:

- Adequately immunized with anthrax vaccine, or
- Placed on appropriate prophylactic antibiotics at the time of their first exposure and continue for 60 days after their last exposure. Because experimental data indicate that viable spores may persist in the lungs for 100 days after exposure, an option is the use of antibiotics for 100 days after exposure.

Long-Term Response Workers

These individuals have repeated exposures over longer periods of time (30 days or more). Environmental response team members and decontamination workers fall into this category. They may work at multiple sites (such as industrial hygienists conducting environmental sampling) or at a single site (such as contractors performing decontamination work).

Long-term response workers should be:

- Adequately immunized with anthrax vaccine before exposure if they are at high risk of repeated exposures.
- Placed on appropriate prophylactic antibiotics, if necessary, for considerably longer than the 60 days recommended for short-term workers. Because experimental data indicate that viable spores may persist in the lungs for 100 days after exposure, an option is the use of antibiotics for 100 days after exposure.
- If the vaccine series is started after exposure has occurred, antibiotic prophylaxis should be continued during the first three doses to provide protection until an adequate immune response has developed.

Occupants, Workers, or Visitors at a Site Contaminated with Anthrax

Postal or office workers or maintenance and housekeeping personnel would fall into this category. The medical program for this group should have two phases: the immediate post-exposure period and the period after a previously contaminated site has been cleared for unrestricted entry and occupancy. Initial medical screening should be done to identify exposed persons who should avoid taking antibiotics.

Medical measures during the immediate post-exposure period:

- Individuals should be placed on appropriate prophylactic antibiotics at the time of their first exposure and continue for 60 days after their last exposure. Because experimental data indicate that viable spores may persist in the lungs for 100 days after exposure, an option is the use of antibiotics for 100 days after exposure.

Once a previously contaminated site has been cleared for re-occupancy, personal protection and medical measures to prevent anthrax are presumably no longer necessary. However, a precautionary program of medical monitoring may be prudent to assure that anthrax is no longer a threat. The program should be designed and administered under the supervision of a licensed physician.

Medical measures after a previously contaminated site has been cleared for unrestricted entry and occupancy should include:

- Initial medical history to screen for high-risk conditions (such as compromised immunity, skin conditions)
- Counseling of high-risk persons
- Around-the-clock access to medical coverage for anthrax-like symptoms
- Confidentiality of medical information

Medical screening and follow-up care for anthrax and medical complications related to preventive measures

The purpose of occupational health surveillance in the workplace is to improve the effectiveness of the occupational health and safety program by systematically collecting and analyzing information that pertains to at-risk workers.
The program for monitoring exposed persons includes:

- **Medical screening program**
  The medical screening program is the use of examinations or tests to detect adverse effects on a worker's health at an early stage when prevention is possible or treatment is most effective. It should include:

  - Baseline medical screening to identify pre-existing conditions that may affect an individual workers fitness for duty, and who should avoid antibiotics or vaccines.
  - Periodic evaluations to reassess fitness for duty and to detect symptoms of the development of anthrax or adverse effects related to preventive measures (such as antibiotics).
  - Final evaluation when it is no longer necessary for a worker to re-enter a contaminated site, to identify changes from the baseline and any new risk factors.

- **Medical monitoring program for adverse work-related health effects**
  The medical monitoring program for adverse effects related to antibiotic use should include the following so that an informed decision appropriate for the affected individual can be made:

  - Plans to inform affected workers about available options for preventing anthrax
  - Risks and benefits of each option

- **Exposure Monitoring (such as incidents of breaches in PPE)**
  There are no validated methods for monitoring a person's exposure to *Bacillus anthracis*. There are useful epidemiologic tools that can be used, but these should not be used to assess a person's exposure or to make decisions about the use of antibiotics or vaccine. These tools include:

  - Nasal swabs
  - Serology

Inhalation exposure to a high concentration of *Bacillus anthracis* spores may rapidly result in death. Therefore, exposure to aerosolized powder known or highly suspected to be contaminated with *Bacillus anthracis* spores should be treated as a medical emergency.

Knowledge and Information that Workers Need to Prevent Anthrax and Medical Complications Related to Preventive Measures

In addition to HAZWOPER training (29 *CFR* 1910.120), response workers will also need additional knowledge and information about anthrax and the medical measures that can protect them. It should be stressed that for preventive measures to be effective, individual workers must fully understand them and use them correctly. All response workers should receive training to:

- Recognize and report early symptoms and signs of anthrax,
- Understand the importance of immediate medical attention,
- Know how to access emergency medical care,
- Know about potential adverse effects and interactions with food and drugs if taking antibiotics, and

- Understand the potential adverse effects of vaccine and the amount of time necessary to develop an immune response if using the vaccine as a preventive measure.

The validity and reliability of symptom reports are only as good as the exposed person's knowledge and understanding of the characteristics of anthrax and risks for developing the disease. Successful treatment of anthrax will depend on the individual's understanding of the need for immediate medical attention should symptoms occur and knowledge of how to access emergency medical care. Therefore, hazard awareness training is an important component of the medical program.

The following links include more detailed information on Medical Program Requirements:

- OSHA's *Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard* 29 *CFR* 1910.120
- Anthrax eTool Disease Recognition page

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

How do I sample and analyze for anthrax?

Environmental sampling is an important tool for determining the presence of *Bacillus anthracis* spores in indoor environments. Sampling can help assess the extent and degree of contamination and the risk of exposure to building occupants and responders. Sample results also contribute to informed decisions on medical treatment and decontamination options and are ultimately used to determine the effectiveness of decontamination.

- General Sampling Plan
- Specific Sampling Objectives
- Sampling Approach
- Sampling Techniques
- Analytical Methods
- Packaging and Transportation of Samples
- Interpretation of Results
- Coordination with Affected Parties

General Sampling Plan

The purpose of a sampling plan is to create a road map to achieving defined sampling objectives. An effective sampling plan will provide confidence that the results obtained are valid and indicative of the contamination present. The sampling plan should address each of the following questions:

- What are the specific sampling objectives?
- What sampling approach will be used to meet the objectives?
- What analytical methods will be used to test for contamination?
- How will samples be packed, handled, and transported?

In evaluating methods that will achieve the sampling objectives, several other factors should be considered:

- Laboratory capability (such as the laboratory's ability to handle the proposed sampling media),
- Collection efficiency of the method, number of samples, and need for quantification,
- Suitability of the sample-collection and analytical methods,
- Cost effectiveness and efficiency of the sampling plan in meeting stated objectives, and
- Utility of the sampling method to the owner and/or federal

agency having jurisdiction over the project.

Specific Sampling Objectives

There are a variety of potential sampling objectives. The specific sampling objectives that may be applicable for an anthrax response may include:

- **Real-time Monitoring:** Determine, in real-time, whether a release of spores is occurring or has occurred in a facility. Real-time instruments may be used to detect biological agents as they are released.
- **Preliminary Assessment of a Facility (Screening):** Determine qualitatively whether any spores are present. Typically, composite samples of large areas and air volumes are obtained to maximize the likelihood of finding contamination.
- **Identification of Spores in a Bulk Material:** Determine qualitatively if a bulk material, such as a powder in an envelope, is contaminated with anthrax. On-site analysis may be used for preliminary assessment, but laboratory analysis provides confirmation.
- **Determination of Contamination of an Article:** Determine whether the surface of a small article is contaminated. Typically, composite surface samples of large articles and/or individual samples of small articles are collected.
- **Extent and Location of Contamination (Site Characterization):** After anthrax is positively identified, further sampling is necessary to determine how far the contamination has spread. Sampling is performed to determine qualitatively, and if possible, semi-quantitatively, the extent and magnitude of contamination.
- **Effectiveness of Decontamination (Process Verification Sampling):** Determine whether decontamination has reduced spores to a safe level.
- **Post-Decontamination Sampling (Re-occupancy Verification Sampling):** Final post-decontamination sampling is conducted inside and outside of the exclusion zone to verify that the originally contaminated environment has been sufficiently decontaminated to allow re-occupancy of the area without the use of personal protective equipment (PPE).
- **Special Re-occupancy Considerations:** There may be site-specific circumstances where additional sampling should be considered.

Sampling Approach

After the sampling objectives have been identified, a logical approach and schedule must be developed to carry out the sampling tasks. The approach and schedule will depend on the objectives.

For Assessment/Characterization:

- **Targeted Sampling Strategy:** If a building or area becomes contaminated from a known source and the source is quickly isolated, the sampling approach will center on the source area and move outward away from the source to define the extent of contamination.
- **Statistically-Based Strategy:** If contamination is likely to be present in a building or area and the source has not been identified, sampling will focus on areas that are statistically the most likely to be contaminated. The objective of statistical sampling is to maximize the probability of detecting contamination.
- **Air Movement and HVAC Considerations:** Spore-bearing particles less than 10 microns in size, or spores themselves, may remain suspended in the air for long periods of time (such as hours or days). In such cases, spores may spread throughout an air space and into adjacent areas on localized air currents, such as those created by people walking by, and also through generalized airflow created by HVAC systems. To fully assess the extent of contamination, the investigator should extend beyond the targeted approach to sample areas on projected contaminant pathways, such as those associated with air movement, dust collection, or work process flow.

For Verification Sampling Prior to Occupancy:

- **Post-Decontamination Surface Sampling:** The effectiveness of decontamination should be confirmed by post-decontamination environmental sampling in ambient air; and in areas and on surfaces that were previously contaminated. Verification sampling prior to occupancy should include surfaces and air in areas outside of the exclusion zone (for example, the area where decontamination activities were conducted) to ensure that the outside areas continue to remain free of spores.

- **Air Sampling:** Aggressive air sampling techniques have been developed for recent anthrax responses that model EPA guidance for clearing facilities for re-occupancy after asbestos decontamination. While the area is under negative pressure, all surfaces are aggressively agitated and air is continuously disturbed while samples are collected. An air sampling method that maximizes the likelihood of detecting contamination should be used.

Sampling Quality Assurance and Quality Control (QA/QC) Considerations:

QA/QC measures must be incorporated into the sampling approach to insure the legitimacy of sampling results. The sampling objectives will dictate the rigor of the QA/QC program for a given site or task. QA/QC includes four key elements:

- QC of field activities

- Sample documentation and management

- Sample handling and shipment

- Data validation and management

Sampling Techniques

There are various sampling techniques available for determining the presence of anthrax in air and surface samples.

The following techniques are available and have proven useful for ***surface and bulk sampling:***

- Wet wipe,

- Wet swab,

- High-volume vacuum with "HEPA" sock (Alsock), and
- Bulk sampling.

The following techniques are available and have proven useful for ***air sampling:***

- Gelatin filter (low volume),
- Mixed cellulose ester (MCE) filter,
- Anderson air sampler and single-stage impactors with seetle plates,
- Open agar plate,
- Dry filter unit (high-volume air sampler with polyester 1-micron filter), and
- Liquid impingers.

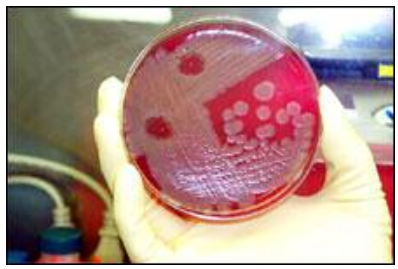
The following links provide additional information regarding sampling techniques:

- Bacillus Anthracis, Environmental Sampling on Surfaces. OSHA (2003, March), 13 pages. This document describes sampling and analysis methods for anthrax surface samples.
- Bacillus Anthracis Spores (Etiologic Agent of Anthrax) in Air. OSHA (2003, March), 22 pages. This document describes sampling and analysis methods for anthrax air samples.

Analytical Methods

The following analytical methods are available for the detection of *Bacillus anthracis:*

- **Immunoassay Tests:** Hand-held assays, sometimes referred to as "smart tickets," are sold commercially for the rapid detection of *Bacillus anthracis* and other biological agents. These assays are intended only for screening environmental samples. Due to their low and questionable sensitivity, they cannot be relied on for a determination that anthrax is or is not present.
- **Polymerase Chain Reaction (PCR):** PCR is a technique that amplifies DNA and compares sequences to known test probe standards for *Bacillus anthracis*. PCR can be used in the field or the laboratory; in either case, the samples must be cultured to confirm that the bacteria is *Bacillus anthracis* and that it is viable. Field PCR systems are very selective, but do not work well with heterogeneous environmental samples, and the probes are very expensive. PCR has been shown to work best as a final confirmation of positive samples taken from plated colonies.
- **Culturing:** Samples may be analyzed for *Bacillus anthracis* using a traditional lab culturing technique. The sample is appropriately prepared for elution and plating, after which it is inoculated onto plates containing sheep blood agar. The plates are allowed to incubate for several hours and are then examined for growth of suspicious colonies.



The laboratory selected for the sample analyses should be consulted by the team developing the sampling plan. The lab should be authorized for work with *Bacillus anthracis* and laboratory procedures must conform to guidance provided by CDC or the Association of Public Health Laboratories (APHL). The lab should also be a part of the Laboratory Response Network (LRN), which was developed by CDC, APHL, and the FBI to help public health labs prepare for and respond to acts of terrorism, including bioterrorism.

The following links provide additional information regarding analytical methods:

- Bacillus Anthracis, Environmental Sampling on Surfaces. OSHA (2003, March), 13 pages. This document describes sampling and analysis methods for anthrax surface samples.
- Bacillus Anthracis Spores (Etiologic Agent of Anthrax) in Air. OSHA (2003, March), 22 pages. This document describes sampling and analysis methods for anthrax air samples.
- Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, Approved Tests for the Detection of *Bacillus anthracis* in the Laboratory Response Network (LRN)
- Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, The Laboratory Response Network for Bioterrorism (LRN) [a slideshow that provides a general overview of the LRN]

Packaging and Transportation of Samples

There are strict requirements for packaging and transporting anthrax samples to ensure that the general public and workers transporting the samples are protected from exposure. These requirements include:

- Rigorous packaging designed to withstand rough handling and prevent leakage,
- Appropriate marking and labeling that identifies the contents of the package,
- Documentation of the hazardous contents of the package and emergency point-of-contact, and
- Training of transportation workers on how to handle the contents in the event of an emergency.

Packaging and transporting anthrax samples are subject to various regulations established by the DOT, CDC, USPS, OSHA, and the International Air Transport Association (IATA). It is also important to consult with the analytical laboratory receiving the samples to determine whether they have additional packaging or shipping requirements.

Additional details on packaging and shipping procedures for anthrax samples, according to CDC guidelines, can be found at:

- Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, Packing Critical Biological Agents (protocols for packing, shipping, and transport of biological agents/diseases)
- Centers for Disease Control and Prevention, Office of Health and Safety, Biosafety Branch, Interstate Shipment of Etiologic Agents (42 *CFR* Part 72)

Interpretation of Results

Since analytical methods are not fully validated for *Bacillus anthracis*, the following considerations are

recommended for interpretation of analytical results:

- Use a multi-disciplinary team of technical experts to interpret the analytical results.
- Consult with field investigators and laboratory personnel during the interpretation process. This will provide the best insight into sample collection and recovery.
- Consider the analytical method limitations and use professional judgment in interpreting any positive or negative findings as well as quantitative or semi-quantitative results.
- In the case of preliminary assessment sampling, positive findings will usually require more extensive sampling in that particular area.
- Laboratories will sometimes report "colony counts" with positive results. In some cases, colony counts can help the data interpretation teams decide how much more extensively to sample in that area, prior to establishing additional isolation and starting decontamination. However, quantitative methods have not been validated for a variety of sample collection methods and the use of "colony count" data is not yet accepted as a reliable indicator of large populations of colony forming units.
- The multi-disciplinary team described above should establish a decision tree for evaluating the adequacy of the sampling and decontamination to coordinate its efforts in reaching a unified conclusion.

Coordination with Affected Parties

Before, during, and after a response, the sampling team should coordinate with the following affected parties:

- Facility manager,
- Union officials, and
- Other individuals who might have site-specific knowledge of the contamination.

The sampling plan should indicate the following:

- Employees working within the affected sampling area need to be informed of the sampling objectives and methods.
- The method of providing results to employees working within the affected sampling area.
- Before sampling begins, employees should be told when, where, and why sampling may occur and they should also be advised when plans are changed.

How should I decontaminate during response actions?

This page provides information on decontaminating buildings or specific areas, systems, or items within buildings after an actual release of anthrax. Anthrax decontamination is a repetitive process that may involve the use of multiple decontamination processes and technologies. Selection of appropriate technologies varies depending on factors specific to the release and to the technologies themselves, but the primary considerations are always the effectiveness and safety of the products and processes.

- Planning for Decontamination
- Preparing for Decontamination
- Decontamination Technologies
- Judging the Effectiveness of Decontamination

Planning for Decontamination

Cleaning an area or item contaminated by anthrax involves numerous and variable issues that are specific to individual locations. No single technology, process, or strategy will be effective in every case. Responders must develop a decontamination plan that takes into account the following:

- **The nature of the contamination:** including the type of anthrax involved, how it entered the facility, and the physical characteristics that affect the spread of contamination.
- **The extent of contamination:** including the amount of contamination and possible pathways by which it could have or will spread.
- **The objectives of decontamination:** including the intended re-use of the facility and building systems and whether items will be decontaminated for re-use or treated for disposal.

The extent of contamination and how the contamination spread are critical considerations in isolating affected areas and selecting appropriate decontamination technologies. For example, if spores are widely dispersed and have traveled through the air, decontamination may involve extensive isolation and fumigation. In contrast, if the contamination is limited to a small area and spores are not likely to become airborne, then minimal isolation and surface decontamination methods alone may suffice.

All stakeholders--local authorities, building owners and residents, federal, state, and local environmental and health agencies, the affected public, and others--should be consulted before decontamination begins. A site health and safety plan (HASP) is needed to protect workers inside and outside the contaminated area, as well as the surrounding population. The facility manager should notify employees and others (such as union representatives) of the nature and scope of the work and its expected duration.

More detailed information about HASPs can be found on the HASP page of this eTool.

Preparing for Decontamination

The results of the sampling for extent of contamination should make it possible to distinguish between contaminated and uncontaminated areas and to determine the types of surfaces involved. To prevent the spread of contamination by movement of workers or equipment, it may be advisable to isolate the contaminated area, depending on the impacted area and the extent of contamination.

Decontamination should address the following:

- **Hidden sources of contamination:** Desktop computers and other objects with internal fans that draw air into the case may have filters or electrostatic devices to control dust intake. These filters or the equipment chassis may be a reservoir of contamination. If selected technologies may damage the item or may not penetrate to hidden locations, then these items may be dealt with in an alternative manner. The manufacturer of the device should be consulted if it is to be saved for re-use.

- **Pre-cleaning:** Excessive amounts of dirt or other organic material on the surface to be cleaned may decrease the effectiveness of the selected decontamination method. Using certain techniques, such as HEPA vacuuming, to remove some of the dirt and debris could reduce the need to perform more aggressive chemical decontamination.

- **Removal of items:** To reduce potential spread of contamination, items should be decontaminated in place. If the selected technology will destroy an item that must be salvaged, then the item may be removed and decontaminated elsewhere with an alternative technology. This requires a means of safe transport and a separate isolation chamber, which adds complexity to the decontamination process.

Additional, more detailed information about sampling for *Bacillus anthracis*, can be found on the Sampling page of this eTool.

Decontamination Technologies

Decontamination technologies can be divided into three categories:

1. **Surface decontamination products**, which are used to treat spores on hard, non-porous surfaces such as desks, walls, and hard flooring. There are two methods to treat surfaces:

   - **High Efficiency Particulate Air (HEPA) Vacuuming:** accomplishes two purposes: (1) it helps remove dirt and other debris that may reduce the effectiveness of subsequent decontamination, and (2) it also removes some of the spores, reducing the number that must be killed by subsequent decontamination. An advantage of this technology is that there is little potential for damage to furnishings. A limitation of this technology is that it can only remove surface contamination. The operator must also avoid allowing the exhaust to stir the air in the affected room and must safely dispose of contaminated filters.

HEPA filters can be attached to high-volume vacuums such as this.

   - **Liquid Antimicrobial Products - Not for Porous Surfaces:** may be used to inactivate spores on hard surfaces only. These products--which can be applied by pouring, mopping, or spraying--include oxidizing, bleaching, or other agents such

as aqueous chlorine dioxide, sodium hypochlorite, hydrogen peroxide, and peroxyacetic acid combined. Several factors should be considered when deciding which liquid antimicrobial products to use and how to apply them. Each product affects surfaces differently in terms of corrosivity, staining, and residue. These products will be effective only if the directions for use of the product are followed precisely (such as mixing directions, application method and dosage rate, pre-cleaning of surfaces, and contact time).

2. **Fumigation**, which involves use of an antimicrobial gas or vapor to destroy aerosolized spores and spores adhered to non-porous and porous surfaces. In addition to decontaminating a variety of surfaces, fumigants are able to decontaminate airborne spores that a surface cleaner would miss.

3. **Other decontamination products**, which are primarily used in chambers or other specialized equipment. Technologies that can be used to decontaminate specific items outside the affected area or environment include the following:

    - **Chemical Sterilization:** chemicals such as ethylene oxide, chlorine dioxide, or paraformaldehyde are used to kill spores on discrete items placed in a sterilization chamber. Sufficient aeration of the items following treatment is necessary to remove residual amounts of the sterilant and any toxic by-products that may have formed. For effective decontamination, each chemical sterilant has specified ranges of temperature, relative humidity, concentration, and duration of application.
    - **Irradiation:** irradiation techniques, including cobalt-60 and electron beam technologies, can effectively destroy anthrax. These techniques are generally available only for off-site decontamination. They may destroy magnetic media such as film or videotape, and they tend to be expensive.

Selection of the appropriate technology will require an evaluation of the specific site conditions and nature of contamination. Other considerations include the conditions required for effective application (for example, humidity for fumigations or pH for certain surface treatments), how the technology will affect the area or item being treated, and the risks associated with use (such as physical, chemical, and toxicologic parameters of the product).

The Environmental Protection Agency's (EPA) Technology Innovation Office (TIO) has developed an information clearinghouse (www.EPATechBiT.org) as a centralized location to collect and disseminate information about decontamination technologies and also for technology vendors to provide information.

Judging the Effectiveness of Decontamination

There are separate criteria, described below, for judging the effectiveness of decontamination of objects in an off-site sterilization chamber, and for decontamination of sites such as offices or buildings.

- For objects decontaminated in an off-site sterilization chamber, biological indicators such as surrogate spore test strips, may be placed in the chamber along with the objects. Although the optimal results of decontamination would be if the biological indicators showed no evidence of bacterial growth, OSHA believes that there may be safe alternatives to the "no growth" decontamination.

- To determine whether decontamination of a site has been effective, a rigorous round of environmental sampling should be performed following the decontamination process, and the samples should be cultured for *Bacillus anthracis* in a nationally accredited lab. Rigorous environmental sampling should be done in all decontaminated sites, regardless of type of technology used or the extent of the decontamination. In areas that have been fumigated,

biological indicators (such as surrogate spore strips) may be used to determine whether the fumigant has effectively permeated the area under specific conditions (such as concentration, time, temperature, and relative humidity) sufficient to kill *Bacillus anthracis* spores. The results of the culture of both the environmental samples and the biological indicators should be evaluated to determine the effectiveness of the fumigation. Again, the optimal results of decontamination would be if the biological indicators showed no evidence of bacterial growth. However, OSHA believes that there may be safe alternatives to the "no growth" decontamination.

A different technology may be used for further decontaminating an area in which sampling showed the presence of viable anthrax spores. For example, if evidence of bacterial growth is found only on a desk in an office that was fumigated, an approved liquid sporicidal product may be applied to complete decontamination of the desk.

Once an area has been determined to be effectively decontaminated, there is no guarantee that all viable spores have been eliminated, even when post-decontamination samples show no growth. Moreover, statistical calculations of the effectiveness of sampling and analytical methods indicate that some spores may remain in a decontaminated area even though environmental sampling shows "no growth." Nevertheless, the potential risk of a person contracting the disease in such an area is considered to be extremely low.

Although the "no growth" decontamination goal may be the best possible way to ensure safety in re-occupying a decontaminated area, OSHA believes that there may be safe alternatives, especially in workplace situations where the use of PPE, special work practices, or other engineering controls might also minimize the risk of disease.

This approach is consistent with the NCP, which allows case-by-case decisions based on the future use of the site and other controls that might be used to ensure safety. Decisions on alternative options such as these would have to be site-specific, and supported by experts in epidemiology, public health, industrial hygiene, and environmental protection. The basis for these types of decisions should also be thoroughly documented.

Additional information about decontamination techniques and process, and post-decontamination sampling strategies can be found on the Sampling page of this eTool.

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

What is a transition program and what elements should I include in my transition program?

A transition program is required for facilities in which anthrax contamination has been identified and normal work operations are conducted. Three examples of this situation include the following:

1. Normal work activities were resumed in a contaminated facility following decontamination and clearance sampling efforts.
2. Original sampling identified low levels of surface and air contamination and therefore occupancy is permitted.
3. Occupancy is permitted outside an established exclusion zone in which decontamination is being performed.

The duration of the program would generally be dictated by sampling results obtained during the transitional period. Site-specific transitional elements should be developed for each facility and incorporated as part of the regular site health and safety plan (HASP). It is recommended that an industrial hygienist develop these elements or at a minimum provide input during the development phase. Transitional Program elements to be included in the HASP include some or all of the following elements, as applicable:

- Hazard Awareness Training
- Medical Surveillance
- Transitional Sampling
- Personal Protective Equipment
- Personal Hygiene
- Interim Standard Operating Procedures

Hazard Awareness Training

Hazard awareness training is intended to communicate information concerning hazards of anthrax and appropriate protective measures to employees. This program may include, but is not limited to:

- Elements of the transition program.
- The health hazards of anthrax, including routes of entry, signs and symptoms of exposure, synergistic effects, and any medical conditions which would place employees at increased risk (i.e., immunocompromised individuals).
- Operations in the work area where anthrax has been identified.
- Dissemination of sampling results to employees, including information on how to gain access to such results.
- Any applicable control measures, such as appropriate engineering controls, work practices,

housekeeping, or personal protective equipment (PPE).

- Implementation of interim standard operating procedures to control anthrax exposure during operations, maintenance, cleaning, etc.
- Frequent updates regarding any on-going anthrax sampling, decontamination, control, medical surveillance, and related activities being performed at the facility, as applicable.

Additional detailed information may be found at the following site:

- Anthrax eTool Training Page

Medical Surveillance

A medical surveillance program is necessary to ensure that employees receive appropriate preventive care. Medical surveillance includes, but is not limited to:

- Identification of employee population at risk and establishment of controls for such employees (such as work reassignment, PPE, prophylactic medication, etc.).
- Administrative follow-up on absentees (such as sick leave, etc.).
- Selection of prophylactic medication, as appropriate.
- Response to symptoms reported by employees.

Additional detailed information may be found at the following sites:

- OSHA's *Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard* 29 CFR 1910.120
- Anthrax eTool Disease Recognition page
- Anthrax eTool Medical Program page

Transitional Sampling

Transitional sampling is conducted to confirm that the occupied areas remain safe for occupancy. Sampling during this period is continued until repeatable results demonstrate that contamination remains below an established target level. Additional information can also be found in the chapter on sampling. Elements of transitional sampling include, but are not limited to, the following:

- Determination of appropriate sampling techniques. Recommended techniques include non-aggressive high-volume air sampling, aggressive HEPA vacuum surface sampling, and if appropriate bulk sampling (such as bulk samples from HEPA vacuum bags used to clean surfaces).
- Use of high-volume air sampling as an essential tool in order to characterize levels of anthrax in the air and provide inhalational exposure information to employees.
- Identification of specific locations and frequency of

sampling.

Additional detailed information may be found at the following site:

- Anthrax eTool Sampling page

Personal Protective Equipment

The workplace must be reassessed in order to select and use appropriate personal protective equipment (PPE) to protect employees from the anthrax hazards present. The specific types of PPE utilized would be dependant on the actual operation in question and results from the reassessment. Examples of work operations where modifications to PPE may be necessary are as follows:

- Operating equipment or working on surfaces where anthrax was previously identified.
- Performing maintenance tasks, such as cleaning equipment or changing HEPA vacuum filters.

Additional detailed information may be found at the following site:

- OSHA's PPE Technical Links page

Personal Hygiene

A personal hygiene program should be implemented to limit exposures and control the spread of anthrax contamination. Procedures that may be required include the following:

- Assuring that food or beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied.
- Regular washing of the hands and/or face, and before eating, drinking, using tobacco, or applying cosmetics.
- Showering as necessary.

Interim Standard Operating Procedures

Interim standard operating procedures (SOPs) must be developed to address special work activities necessary under the transitional program. Affected employees should receive training on the interim SOPs. These SOPs may include, but are not limited to, the following topics:

- Maintenance and housekeeping procedures developed or modified to control the spread of contamination and protect employees. Examples of procedures include:
  - Use of HEPA vacuums for cleaning surfaces instead of sweeping or other methods,
  - Cleaning, maintenance, and filter and bag removal for HEPA vacuums,
  - Maintenance and cleaning of facility equipment,
  - Cleaning of floors and other surfaces, and
  - Handling and disposal of wastes.

- Changes to regular work operations and equipment, as applicable.
- Modifications to facility-wide mechanical systems, particularly heating, ventilation, and air-conditioning (HVAC) systems. Examples of HVAC modifications include:
  - Increase in ventilation rates (air changes per hour)
  - Increase in percentage of outside air
  - Use of HEPA filters to collect dust in circulated air
- Other applicable major elements being implemented as part of the transitional program, as described previously (such as training, medical surveillance, sampling, PPE, and hygiene).

Additional detailed information may be found at the following site:

- Anthrax eTool HASP page

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Additional Anthrax Response Information

The links associated with anthrax response are categorized as follows:

- Comprehensive Anthrax Response References
- Mail Handling
- Health and Safety Plans / Medical Surveillance Programs
- Training and Personal Protective Equipment (*Code of Federal Regulations*)
- Sampling, Packing, and Transorting *Bacillus anthracis*
- Decontamination

Comprehensive Anthrax Response References

- National Response Team, *Technical Assistance for Anthrax Response, Interim-Final Draft*, October 2002.

Mail Handling

- Centers for Disease Control and Prevention (CDC) Health Advisory, *Updated Information About How To Recognize and Handle a Suspicious Package or Envelope*, *Distributed via the Health Alert Network October 31, 2001, CDCHAN-00050-01-10-31-ADV-N.*
- *Federal Bureau of Investigation (FBI) Advisory Poster, If you receive a suspicious letter or package, what should you do?, General Information Bulletin 2000-3.*
- *United States Postal Service, Mail Center Security Website.*
- *Public Health Foundation, Bioterrorism/Emergency Preparedness, **Video:** Protecting Your Health for People Who Process, Sort, and Deliver the Mail*

Health and Safety Plans / Medical Surveillance Programs

- *OSHA's electronic health and safety plan template*
- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Notice to Readers: Occupational Health Guidelines for Remediation Workers at *Bacillus anthracis*-Contaminated Sites --- United States, 2001--2002 [September 6, 2002 / 51(35);786-789]
- American Conference of Governmental Industrial Hygienists (ACGIH), *2002 TLVs® and BEIs®* (extreme temperature reference), Publication #0102.

Training and Personal Protective Equipment (*Code of Federal Regulations*)
④ 29 *CFR* 1910.120, *Hazardous Waste Operations and Emergency Response (HAZWOPER)* ④ 29 CFR 1910.38(a), Employee Emergency Plans and Fire Prevention Plans ④ 29 *CFR* 1910.1200, *Hazard communication* ④ 29 *CFR* 1910 Subpart I (Sections 132 to 139), *Personal Protective Equipment* ④ 49 CFR 172 Subpart H, *Transportation Training;* consult the *Code of Federal Regulations* website for the most current version

Sampling, Packing, and Transporting *Bacillus anthracis*
④ Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, The Laboratory Response Network for Bioterrorism (LRN) [a slideshow that provides a general overview of the LRN] ④ Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, Approved Tests for the Detection of *Bacillus anthracis* in the Laboratory Response Network (LRN) ④ Centers for Disease Control and Prevention, Public Health Emergency Preparedness and Response, Packing Critical Biological Agents (protocols for packing, shipping, and transport of biological agents/diseases) ④ Centers for Disease Control and Prevention, Office of Health and Safety, Biosafety Branch, Interstate Shipment of Etiologic Agents (42 *CFR* Part 72)

Decontamination
④ The Environmental Protection Agency's (EPA's) Technology Innovation Office (TIO) has developed an information clearinghouse (www.EPATechBiT.org) as a centralized location to collect and disseminate information about decontamination technologies and also for technology vendors to provide information.

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

THANKS TO OUR CONTRIBUTORS

Technical Editorial Board

Primary Authors:

- Bob Curtis, OSHA Directorate of Science, Technology and Medicine: eTool Program Director
- Todd Jordan: Project Lead, OSHA DTSM, Industrial Hygienist
- Brian Liddell: Project Lead, OSHA DTSM, Industrial Hygienist
- Donald Marano, Craig Eaton, Natalie Bay, Elizabeth Johnson: IHI Environmental, Industrial Hygienists
- Ryan Aslami: Consultant for content development

Principal Reviewers:

- Donna Miles, OSHA Office of Public Affairs

Support Personnel

- Rhett Thomas, Thomas Websites: Project Coordinator, Content Development, Graphical Layout/Design, HTML/JavaScript Programming, Technical Writing
- Kym Pond: HTML Presentation
- Christie Stewart: Graphics

Special Thanks

- Microsoft for the use of its Clip Art Gallery
- Getty Images
- Ger Versluis for the HV MENU programming script

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

This eTool is not a new standard or regulation, and creates no new legal obligations. The eTool is advisory in nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace through effective prevention programs adapted to the needs of each place of employment.

The Occupational Safety and Health Act requires employers to comply with hazard-specific safety and health standards. In addition, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm under Section 5(a)(1), the General Duty Clause of the Act. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take steps to prevent or abate the hazard. However, failure to implement these guidelines is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

The Department of Labor maintains this Web site to enhance public access to the Department's information. This is a service that is continually under development. We will make every effort to keep this site current and to correct errors brought to our attention.

The documents on this site contain hypertext pointers to information created and maintained by other public and private organizations. Please be aware that we do not control or guarantee the accuracy, relevance, timeliness, or completeness of this outside information. Further, the inclusion of pointers to particular items in hypertext is not intended to reflect their importance, nor is it intended to endorse any views expressed or products or services offered by the author of the reference or the organization operating the site on which the reference is maintained.

Translations of any materials into language other than English is intended solely as a convenience to the non-English-reading public. We have attempted to provide an accurate translation of the original material in English, but due to the difficulties of translation slight differences may exist. References identifying the original document in English are available in most non-English documents.

Close this Window