

**United States Postal Service**  
**Response to the General Accounting Office**  
**Recommendations on the Anthrax Attacks of 2001**

**August 2004**

United States Postal Service  
Safety Performance Management  
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Washington, D.C. 20260

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# Foreword

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The United States Postal Service prepared this report in response to General Accounting Office (GAO) recommendations concerning the anthrax attacks of 2001. As GAO recommended, the Postal Service prepared this report in concert with the Centers for Disease Control and Prevention (CDC), Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and postal unions. CDC, EPA, OSHA and the Postal Service concur with the report's conclusions. This report responds to the GAO recommendations that the Postal Service and other relevant agencies do the following:

- ◆ Reassess the risk level for postal workers and the public in tested facilities.
- ◆ Reconsider the advisability of retesting those facilities.
- ◆ Communicate the results of the reassessment to employees and the public.

As detailed in the report, the agency experts and members of employee unions met with representatives of the Postal Service and other federal agencies on several occasions to perform the reassessment, determine whether further sampling was advisable, and create a communication plan.

The postal unions were fully involved in all deliberations, and are free to comment on the report and endorse or reject its contents.

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# Executive Summary

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On May 19, 2003, General Accounting Office officials testified before the Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform. The title of the testimony was “U.S. Postal Service: Issues Associated with Anthrax Testing at the Wallingford Facility.”

The following recommendations were made during the testimony:

The impact of additional anthrax cases could result in illness or loss of life as well as loss of confidence in the nation’s postal system. Further, even though the health risk is probably low, it is uncertain; we therefore recommend that the Postmaster General, in consultation with CDC, EPA, OSHA, as well as any other relevant agencies and postal unions, for those facilities that were deemed to [be] free of anthrax spores based solely on a single negative sampling result, (1) reassess the risk level for postal workers at those facilities and the general public served by those facilities, (2) reconsider the advisability of retesting those facilities and employing the most effective sampling methods and procedures, and (3) communicate to the postal workers and the general public the results of the reassessment of health risk, the advisability of retesting, the rationale for these decisions, and other relevant information that may be helpful regarding the health of the postal workers and the general public (GAO 2003).

This report has been prepared by the U.S. Postal Service with assistance from several federal agencies and labor unions. The following agencies and unions participated in preparing the report: Department of Homeland Security (DHS)<sup>1</sup>, Centers for Disease Control and Prevention (CDC), Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), American Postal Workers Union (APWU), National Association of Letter Carriers (NALC), National Postal Mail Handlers Union (NPMHU), and the National Rural Letter Carriers Association (NRLCA).

The participating organizations formed a workgroup to review and share information relating to the anthrax incidents, including sampling processes, epidemiology of the incidents, work practices and engineering controls, and other precautions instituted since October of 2001. The workgroup, with subject matter experts from CDC, EPA, and OSHA, discussed and analyzed the facts and reached conclusions on the current risk that may be posed to postal workers and the public as a result of the anthrax-related events of 2001. The mail handler's, city and rural letter carrier's unions reviewed and concurred with the workgroup's conclusions.

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<sup>1</sup> The DHS participated in the initial workgroup discussions and assisted in coordinated inter-agency activities.

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The APWU reviewed and provided comments concerning those same conclusions.

The workgroup concluded that the anthrax risk level for postal workers in the facilities tested, and the general public served by those facilities, is negligible. No further sampling is warranted for those facilities that tested negative for anthrax spores. It further concluded that additional testing would not appreciably increase the safety of postal premises for employees and customers. Several factors contributed to this conclusion:

- ◆ Continuation of illness tracking by the Postal Service and federal, state, and local health agencies reveal that no epidemiological evidence of inhalational or cutaneous anthrax has occurred in postal employees or customers since November 2001.
- ◆ The Postal Service continues to use anthrax-related engineering controls and work practices that reduce the potential for a re-aerosolization event.
- ◆ Under no circumstances was a single sample used to assess a facility and clear it for continued operation, and no facilities were “deemed to [be] free of anthrax spores based solely on a single negative sampling result” (GAO 2003).

The Postal Service, in conjunction with the workgroup members, has developed a plan to communicate the findings of this report to employees and the public.

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# Chapter 1

## Background

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### IMPORTANT TERMS AND DEFINITIONS

This section defines the terms and definitions that are important for discussing risk in the context of this report. They are presented logically by topic area.

- ◆ **Anthrax:** The name of the acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Although it most commonly occurs in hooved mammals, anthrax can infect humans. Anthrax spores can remain dormant for many years.
- ◆ **Contamination:** Bioterrorism involves the deliberate introduction of viable anthrax spores (or other infectious hazards) into an area or workplace, leading to contamination of surfaces and airspaces in the targeted location.<sup>2</sup> Naturally occurring anthrax spores tend to clump together, making them difficult to spread into the air. However, “weaponized” anthrax spores are treated to reduce clumping, which makes the spores easier to “aerosolize,” prolongs their ability to stay in the air, and increases the likelihood that they will be breathed in by potential victims and lead to inhalational anthrax. After the initial contamination episode ends, additional activity may resuspend the spores in the air (also known as re-aerosolization), which can lead to additional contamination events, especially when the contamination event is not easily observable. It is not known how common re-aerosolization is or how much of the original material is available for resuspension.

Environmental air samples taken during an anthrax contamination event can identify the presence of *B. anthracis* spores in a tested airspace, but air samples collected after an event may be negative if the spores have already settled onto surfaces. Environmental surface samples taken after an anthrax contamination event can help identify the presence of *B. anthracis* spores on a tested surface. A positive result indicates contamination at that location. Surface samples are the primary tool for evaluating contamination, but surface contamination is not the same as exposure. Surface contamination indicates that a given location has a potential reservoir of spores that, if contacted or disturbed, could lead to exposure.

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<sup>2</sup> In this context, contamination relates to the ability of *B. anthracis* spores to grow and become viable bacteria, as determined through sampling and culture plate analytical methods accepted by CDC.

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- ◆ **Cross-contamination:** The transfer of anthrax spores from one surface to another after contact. Postal examples of cross-contamination include one mail piece contaminating an adjoining mail piece, a mail piece contaminating the sorting machine it passes through, and a contaminated sorting machine contaminating subsequent mail pieces. Cross-contamination is the mechanism that led to contamination in downstream postal facilities.
  - ◆ **Decontamination:** A variety of physical and chemical treatments can be used to inactivate,<sup>3</sup> kill, or remove *B. anthracis* spores. Decontamination can “clean” a surface to greatly reduce any potential for future re-aerosolization and exposure episodes. For example, bleach or other specific wet cleaning methods can be used to reduce surface contamination levels. Also, fumigation (e.g., chlorine dioxide gas) can kill anthrax spores.
  - ◆ **Exposure:** Human contact with spores in a contaminated location. Surfaces and airspaces may serve as exposure pathways. Touching a contaminated surface may cause skin exposure that may potentially lead to cutaneous anthrax. Mechanical forces applied to contaminated mail during the sorting process may create a plume of airborne spores, leading to possible inhalation exposures for workers operating the equipment or working nearby. The use of compressed air for cleaning has the potential to re-aerosolize settled spores and contaminate the nearby airspace, which may then lead to exposure for the workers in the vicinity and to contamination of new surfaces when the spores settle out.

Several factors and considerations influence the likelihood that a contaminated surface can contribute to exposure. They include worker proximity to such surfaces, worker activities and task patterns that might create aerosols, the ability of machines to aerosolize spores, use of compressed air, and locations of fans and ventilation systems.

- ◆ **Primary aerosolization:** Available information, from previously known cases, (Meselson et al. 1994 and Inglesby et al. 2002) suggests that the greatest risk for inhalational disease to humans exposed to an aerosol of *B. anthracis* spores occurs when spores are first made airborne. An initial event may involve multiple aerosolizations. This period is called “primary aerosolization.”
- ◆ **Secondary aerosolization:** Following the period of primary aerosolization, *B. anthracis* spores may settle out on surfaces. The rate of settling is influenced by various factors such as particle size and air movement. Secondary aerosolization results from the disruption and resuspension of the settled particles and spores via physical force or activity (e.g., use of compressed air cleaning). Many variables affect the likelihood of a secondary aerosolization, including powder characteristics, particle charge, how

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<sup>3</sup> Inactivation refers to irreversible inactivation as described by E. Whitney et al. (2003).

spores are weaponized, the surface involved, climatic factors (e.g., humidity), and the nature of the human or mechanical activity that occurs in the affected area. Studies done in the Hart Senate Office building (Weis et al. 2002) show that some treated spores can be resuspended by routine activities such as walking near contaminated surfaces. The risk to humans associated with this level of resuspension is unclear.

- ◆ **Infectious dose:** The minimum dose needed to cause infections in humans. This dose is still uncertain with anthrax exposure. Individuals typically vary in their susceptibility to infection, so a given dose can affect some but not all individuals in a given group. However, the theoretical lower range of infectious dose for inhalational anthrax may be as few as one to three spores based on extrapolation from primate studies (Inglesby et al. 2002).
- ◆ **Incubation period:** The time interval between initial exposure to an infectious agent and the appearance of the first sign or symptom of the disease.
- ◆ **Cutaneous anthrax:** This is the most common type of naturally acquired anthrax infection (greater than 95 percent) and usually occurs after skin contact with contaminated products from infected animals (e.g., carcasses, meat, wool, hair, hides, or leather). Infection begins as a pruritic papule (itchy bump) or vesicle that enlarges and erodes (1–2 days), leaving a necrotic ulcer with subsequent formation of a central black eschar (scab). The lesion is usually painless, with surrounding edema, hyperemia (increased blood supply), and regional lymphadenopathy (swollen lymph glands). Patients may have associated fever, malaise, and headache. Historically, the case-fatality rate for cutaneous anthrax has been less than 1 percent with antibiotic treatment and 20 percent without antibiotic treatment. Following the bioterrorism attack in fall 2001, there were 11 patients with cutaneous disease with no fatalities.
- ◆ **Inhalational anthrax:** The most lethal form of anthrax; it can result from aerosolization of *B. anthracis* spores through industrial processing or intentional release. Inhaled spores may remain dormant in the lungs or lymphatic system for weeks to months before germinating. After germination in alveolar macrophages, vegetative organisms may replicate and cause symptomatic disease. Reported incubation periods have ranged from 1 to 43 days after initial exposure, depending on the dose of *B. anthracis* inhaled and the use of antibiotics. Person-to-person spread of inhalational anthrax has not been documented.

Disease may initially involve a prodrome (preliminary phase) of fever, chills, nonproductive cough, chest pain, headache, myalgia, and malaise. However, more distinctive clinical hallmarks include hemorrhagic mediastinal lymphadenitis, hemorrhagic pleural effusions, bacteremia, and

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toxemia resulting in severe dyspnea (difficulty breathing), hypoxia, and septic shock.

Case-fatality rates for inhalational anthrax are high, even with appropriate antibiotics and supportive care. Among the 18 reported cases of inhalational anthrax in the United States during the 20th century, the overall case fatality was greater than 75 percent. Following the bioterrorism attack in fall 2001, the case fatality rate among patients with inhalational disease was 45 percent (5 of 11 cases), despite the availability of antibiotics and intensive medical care.

- ◆ **Risk:** In this report, risk is defined as the overall likelihood for contracting anthrax and the further likelihood of death. Risk is dependent on all the variables that affect contamination, exposure, disease detection, and medical treatment. The virulence of different anthrax strains can affect risk. The type of exposure (skin vs. inhalation) affects the risk of death since cutaneous anthrax is significantly less lethal than inhalational anthrax. The extent of anthrax spore weaponization can affect the risk of disease because weaponized spores are more likely to form aerosols, stay in the air longer to increase exposure, and are more likely to be inhaled deeply into the lungs. Variation in individual susceptibility further influences risk.

In general, all available information and evidence were considered when evaluating risk. This includes epidemiological findings, environmental sampling results, and engineering and exposure factor information. Environmental contamination results alone cannot be the sole determinant of risk.

- ◆ **Negligible risk:** For this report, the term negligible risk means that the presence of some residual anthrax spores from the 2001 attacks is possible, but the unknown amounts are unlikely to cause disease. It is not scientifically accurate to speak of “zero risk” given the limitations of current detection methods and data gaps concerning infectious dose and risk factor issues.

## THE INHALATIONAL ANTHRAX DISEASE PROCESS

The terms and definitions in the previous section help to describe the multi-step process associated with anthrax disease. Given its much higher mortality rate, the primary disease concern is inhalational anthrax. The prerequisites for inhalational anthrax are that contamination must occur, conditions must lead to aerosolization of spores, and individuals must be present during aerosolization for exposure to occur. Each of the steps in this sequence must occur to create the conditions for disease development. A variety of factors (e.g., the physical characteristics of spores and the proximity of workers to the contaminated location) affects the likelihood of each step to influence the resulting risk of disease. In addition, there are opportunities for prevention and control interventions to interrupt the sequence leading to risk and disease. For example, steps can be taken post-exposure, such as provision of prophylactic antibiotic medication, to reduce the likelihood of disease development.

In examining the risk of inhalational anthrax disease, this report addresses fundamental questions related to the prerequisite steps. The following hypothetical questions provide a framework for evaluating the key issues associated with potential risks:

1. Aside from the postal facilities already identified, what is the likelihood that other postal facilities or locations were contaminated via cross-contaminated mail in fall 2001?
2. Given that the Postal Service has taken measures intended to clean locations that were most likely to have been contaminated, what is the likelihood that the spores remain if undetected contamination occurred?
3. If these hypothetical undetected spores are still present in a facility, what is the likelihood that secondary aerosolization can still occur?
4. If secondary aerosolization were to occur, what is the likelihood that it would result in sufficient employee exposure to cause disease?
5. If employee exposure and illness were to occur as a result of the above steps, what is the likelihood that timely treatment would be provided?

This report presents background information for looking at these questions in the sections that follow, beginning with a review of the events of 2001.

# THE ANTHRAX ATTACKS OF 2001

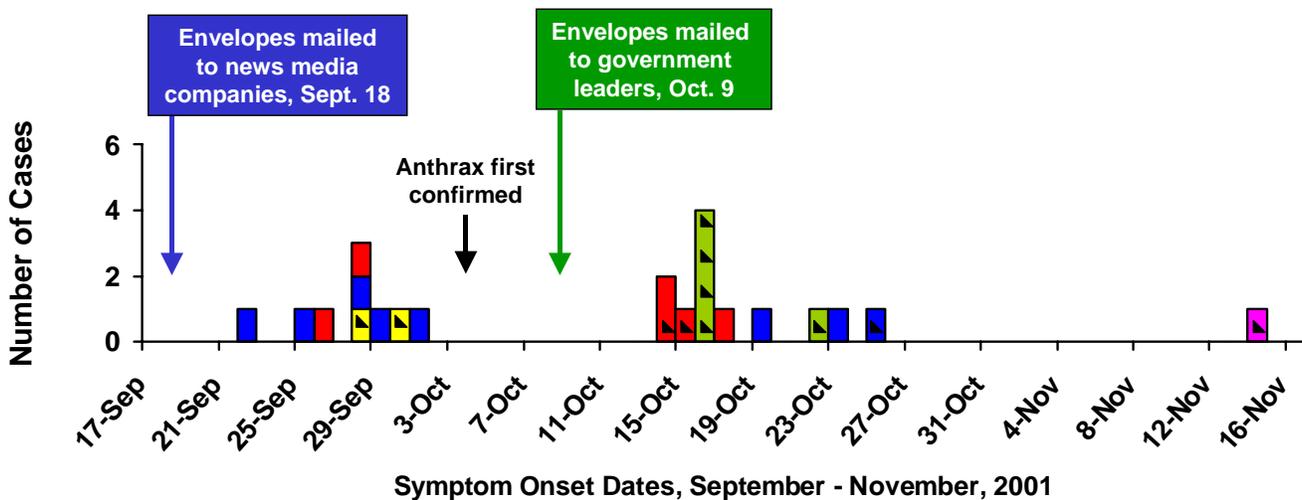
The following information is derived from CDC reports.

From October 4 to November 20, 2001, 22 cases of anthrax (11 inhalational, 11 cutaneous) were identified; five of the inhalational cases were fatal. Twenty (91 percent) case-patients either were mail handlers or exposed to worksites where contaminated mail was processed or received. Nine of the 11 inhalational cases occurred with postal and non-postal workers who directly handled mail or serviced mail-processing equipment (MPE). Four letters are known to have been mailed. The following figures, excerpted from a CDC report (Jernigan et al. 2002), summarize the mail path and resultant disease.

Figure 1-1 shows the relationship between the number, location, and timeline of all 22 known cases of anthrax in the United States, both inhalational and cutaneous, resulting from the two bioterrorism attacks. Two distinct case clusters were separated in time, with no cases occurring during the 13-day period between clusters. One case of inhalational anthrax occurred in a Connecticut resident 20 days after the second case cluster.

Figure 1-1. Epidemic Curve for 22 Cases of Bioterrorism-Related Anthrax,

United States, 2001



■ Florida 
 ■ New York City 
 ■ New Jersey 
 ■ Dist. of Columbia\* 
 ■ Connecticut

▲ = inhalational anthrax case,

\* = Metropolitan District of Columbia Area, cases were residents of Maryland (3) and Virginia (2)

The first cluster of nine cases began approximately 4 days after the September 18 envelopes were mailed. The Jernigan study summarized the findings in the following manner:

All seven cases from New York City and New Jersey in the first case cluster were cutaneous anthrax; all five New York City cases included media company employees or visitors. Both New Jersey cases were in postal employees. The two cases from Florida were both inhalational anthrax and were in media company employees. Overall, eight of the nine persons in the first case cluster were exposed to worksites (postal facilities or media companies) that had environmental samples positive for *B. anthracis* [2002].

The second case cluster began about 5 days after the October 9 envelopes were mailed. Jernigan et al. summarized these findings as follows:

All five cases from the D.C. metropolitan area were in the second case cluster, all were inhalational anthrax, and all case-patients worked in postal facilities contaminated by the *B. anthracis*-containing October 9 envelopes. The last two cutaneous cases from New York City, whose onsets of illness occurred in the second case cluster, were known to have handled the September 18 New York Post envelope when it was moved in mid-October before its identification. Of the four New Jersey cases in the second cluster, two were inhalational anthrax in postal employees, one was cutaneous anthrax in a postal worker, and one was cutaneous anthrax in a bookkeeper who worked at a nearby commercial office building; all four case-patients were exposed to worksites that had environmental samples positive for *B. anthracis* [2002].

Based on established mail paths, the remaining two cases in this cluster are reported to result from cross-contamination with the *B. anthracis*-containing envelopes sorted at Trenton Processing and Distribution Center (P&DC) in Hamilton Township, NJ.

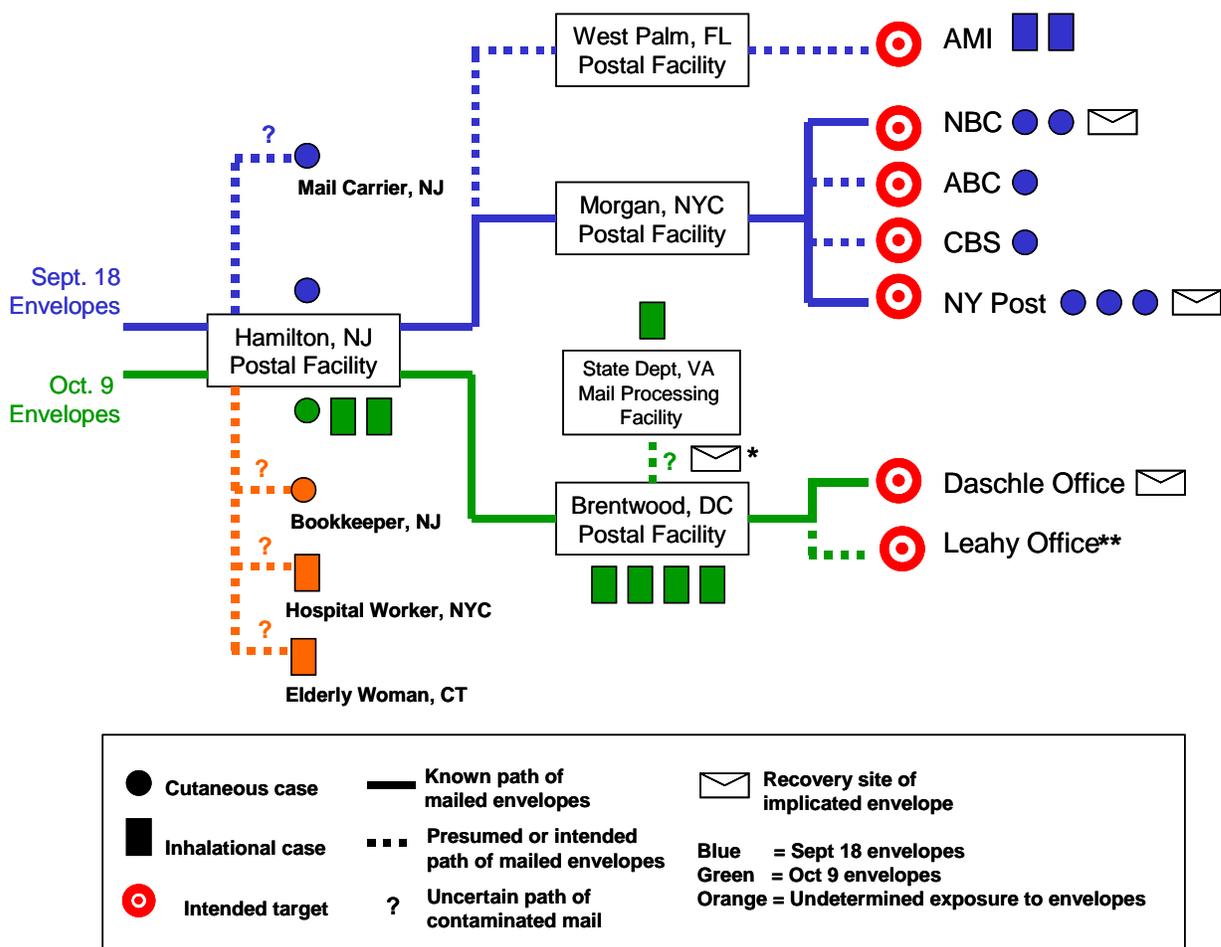
P&DCs employ high-speed, automated MPE to mechanically sort mail. The various sorting machines mechanically squeeze the letters during processing, which can create a bellows effect that may result in the formation of aerosols. During the 2001 attacks, there were nine anthrax cases involving Postal Service employees (six inhalational and three cutaneous), eight of which occurred at two of the four processing and distribution facilities—Trenton P&DC in Hamilton Township, NJ, and Brentwood P&DC in Washington, DC. No anthrax cases occurred at the other two P&DCs that processed *B. anthracis*-containing envelopes (West Palm Beach, FL, and Morgan Station, New York City).

The one postal worker anthrax case that occurred at a non-P&DC facility was a cutaneous anthrax case in a city letter carrier employed at the West Trenton Post Office (PO). Since this facility sends and receives mail through the Trenton P&DC, this case was likely caused by exposure via cross-contaminated mail. The West Trenton PO city letter carrier anthrax case was (1) the first Postal Service

anthrax case, (2) the first case linked to unopened mail, and (3) the only Postal Service case that occurred at a facility without MPE. This city letter carrier never worked at nor visited the Trenton P&DC, but the mail that this carrier delivered on September 19 had been sorted at the Trenton P&DC on September 18 using the same machines that had sorted the New York City letters earlier that day (Greene et al. 2002).

Figure 1-2 shows the relationships among the four Postal Service P&DCs known to have processed a *B. anthracis*-positive, powder-containing envelope. It also shows where the four contaminated envelopes were recovered.

Figure 1-2. Cases of Anthrax Associated with Mailed Paths of Implicated Envelopes and Intended Target Sites



\* Unopened envelope addressed to Senator Leahy found in a barrel of unopened mail sent to Capitol Hill, on November 16, 2001.

\*\* Dotted line indicates intended path of the envelope addressed to Senator Leahy.

## Chapter 2

# Postal Service and Governmental Testing of Postal Facilities

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The initial sampling of potentially contaminated mail-handling facilities focused on following the mail trail and the pathway of disease occurrence from the AMI facility, in Florida, and the Trenton, NJ, and Washington (Brentwood), DC, P&DCs. The actual sampling of these facilities was performed by several organizations:

- ◆ U.S. Postal Service environmental contractors
- ◆ U.S. Environmental Protection Agency (EPA)
- ◆ Centers for Disease Control and Prevention (CDC)
- ◆ Federal Bureau of Investigation (FBI), generally for evidentiary purposes only.

## POSTAL SERVICE RATIONALE AND PROCEDURES FOR TESTING IN FALL 2001

In response to findings of contamination in a number of postal facilities, the Postal Service prepared interim guidance addressing issues such as decontamination, communication, employee notification, and interim cleaning procedures. It also launched a “pre-screening sampling” initiative to further determine whether anthrax spores were present in other postal facilities (USPS 2001). Mail flow data were used as initial criteria to identify facilities that received 1 percent or more of their mail from either the Trenton or Brentwood P&DCs. Several facilities (e.g., the Indianapolis Repair Facility and Kansas City Stamp Fulfillment Center) were included in the sampling initiative on the basis of plausible non-mail pathways such as potentially contaminated machine parts or stamp stock. The initiative included guidance for contractors on what sampling methods to use and which areas to test. This initiative resulted in the targeting of 179 facilities, including 109 P&DCs, 22 POs, and 48 other facility types. The three tables in Appendix C contain relevant information on the facilities tested.

The table in Appendix A shows the evolution of the sampling strategy that developed from October 16 to November 16, 2001, as the anthrax incident information flows were identified and pre-screening was assessed.

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Several sampling methods were used at the outset of the initial response before the pre-screening initiative. They included the following:

- (1) Wet swab sampling with RAPID™ polymerase chain reaction (PCR) sample analysis and laboratory plate culture analysis backup
- (2) Dry swab sampling with analyses performed by PathCon Laboratories, (Pathogen Control Associates, Inc.)
- (3) Dry swab, wet swab, wet wipe, and high efficiency particulate air sock (HEPA sock) sampling used by various agencies, with analyses performed at various state or contract laboratories using Laboratory Response Network (LRN) procedures.

The Postal Service's objective was to provide consistent and uniform sampling procedures. Sampling protocols, using dry swab techniques and analyses of the samples by laboratories belonging to the Association of Public Health Laboratories (APHL), were finalized on November 5, 2001. The need for analysis of a large number of samples (more than 6,600) across 43 states necessitated close coordination with APHL to ensure that reliable analyses could be obtained in a short time.

At the time, a number of sample collection methods had been successfully used for evaluation of anthrax contamination. Of these methods, use of dry swabs was preferred by analytical laboratories because it minimized potential interferences and was the safest procedure for laboratory personnel. Laboratory capability and capacity were important issues, given the large surge in requests for analysis during November 2001. In summary, dry swabs were viewed, at this time, as an acceptable method for environmental evaluation. Dry swab issues are discussed further in the section on Environmental Sampling and Analysis of Chapter 3.

The new sampling procedures were transmitted to all sampling contractors on November 8, 2001. These procedures (see Appendix B) were uniformly implemented by the Postal Service in sampling that occurred on or after November 8, 2001. The Postal Service's *Interim Anthrax Guidelines* draft sampling procedures, and supporting rationale for development of a consistent sampling approach and protocol, were submitted for Postal Service Headquarters review on November 16, 2001, and published as an interim guidance document on November 28, 2001 (USPS 2001).

## EPA AND CDC RATIONALE AND PROCEDURES FOR TESTING IN FALL 2001

### EPA

In coordination with CDC and state health departments, EPA participated in the initial response activities in the Florida outbreak investigation. Those activities involved collecting wet-swab and wet-wipe samples in locations determined (targeted) to be the most likely to be contaminated. At Postal Service facilities, these areas included critical locations such as processing equipment, sorting boxes, and drop locations. Analysis was performed using CDC-approved culture methods at public or contracted laboratories.

Post-remediation sampling to verify the efficacy of decontamination involved collecting samples in the same locations where contamination was originally discovered. Additional samples also were collected in peripheral locations to determine whether the contaminant had spread.

### CDC

In fall 2001, CDC participation was triggered by reports of anthrax cases from local health departments. In coordination with local health departments and the Postal Service, CDC provided technical assistance and performed outbreak investigations to identify the source of the exposure and determine whether additional public health interventions were needed (e.g., antibiotic prophylaxis and vaccines). In some cases, it selected facilities for testing because postal employees at that particular facility had contracted anthrax (e.g., Trenton and Brentwood P&DCs). In other cases, facilities were tested as part of epidemiologic investigations looking for clues on the role that cross-contaminated mail might have played in non-postal cases (such as the news media cases in West Palm Beach and New York City). Lastly, some facilities were tested based on sampling, epidemiologic, or mail-flow patterns that suggested cross-contamination of mail may have resulted in their contamination (e.g., all 50 downstream post offices from Trenton P&DC). Environmental testing targeted locations such as sorting machines and bins considered most likely to be contaminated. Sampling primarily employed wet swabs, along with some wet wipes and HEPA sock samples. CDC's environmental sampling procedures are described in "Comprehensive Procedures for Collecting Environmental Samples for Culturing *Bacillus anthracis*" (CDC 2002). Samples were analyzed using CDC-approved methods by state health departments, CDC, and contract laboratories. CDC, the Agency for Toxic Substances and Disease Registry (ATSDR), and EPA collaborated on sample collection at the facilities affected by the Florida anthrax cases. In general, CDC testing efforts utilized wet swab methods along with wet wipes and HEPA sock samples. Dry swabs were used in the New York City outbreak investigations because they were consistent with the sampling analysis protocol used by the New York City

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Department of Health Public Health Laboratory (Marfin et al. 2002). The overall sampling effort identified several cross-contaminated locations during October and November 2001.

## SUMMARY OF TESTING DATA

The overall sampling process occurred as follows:

- ◆ There were 298 sampling efforts at 286 facilities.<sup>4</sup> These totals include efforts by the Postal Service (or its contractors), CDC, EPA, and FBI. More than one agency performed sampling at 12 of the facilities.
- ◆ Twenty-three facilities were considered to have some degree of anthrax contamination. This was based on positive environmental test results.
- ◆ The West Trenton PO was considered a special case in that it experienced a cutaneous anthrax case but no positive environmental test results. The FBI and CDC took a total of 42 samples at the West Trenton PO, including 6 HEPA sock samples.
- ◆ Three facilities were found positive in sampling conducted by more than one agency—Morgan P&DC, Brentwood P&DC, and West Palm Beach P&DC.
- ◆ Environmental sampling methods included wet swabs, HEPA socks, RAPID™ PCR backed by laboratory culture analysis, dry swabs, and wet wipes.
- ◆ Analytical methods included RAPID™ PCR and culture methods.<sup>5</sup>
- ◆ Sampling highlights for each of the agencies involved with sampling are provided below:
  - Postal Service contractors tested 179 facilities and found six that tested positive. Three of the six facilities were found positive only by the Postal Service (Raleigh P&DC, Indianapolis Repair Facility, and Kansas City Stamp Fulfillment Services). However, the remaining three facilities were also found positive by other agencies (Brentwood P&DC, Morgan P&DC, and West Palm Beach P&DC).

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<sup>4</sup> Since the total number of facilities sampled by the FBI was not available, the total of 298 sampling efforts includes only the two facilities where the FBI was the sole agency to find positive results.

<sup>5</sup> The Postal Service applied many methods to determine the presence or absence of anthrax bacilli, with RAPID™ PCR used initially as a screening method. However, information provided by U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) indicated that this method was not suitable for screening environmental samples. The USPS ceased use of RAPID™ PCR as a screening method on November 9, 2001.

- The CDC tested 112 facilities and found 12 that tested positive. Of the facilities testing positive, Morgan P&DC and Brentwood P&DC were also tested and found positive by other agencies. The 10 additional positive facilities were located downstream from the Brentwood and Trenton facilities.
- The EPA, with CDC involvement, tested and found seven facilities that tested positive. Of this group, West Palm Beach P&DC was also found positive by another agency. The remaining six facilities were located downstream from the West Palm Beach facility.
- The FBI tested an unknown number of facilities for forensic purposes. Of the facilities tested by the FBI, only South Jersey P&DC (also known as Bell Mawr P&DC) and the West Windsor/Princeton PO have been included in the total. These were the two facilities where the only positive results were reported by the FBI.
- ◆ The determination of contamination of a facility was never based on just a single sample; the fewest number of samples collected at any facility was four—at three downstream post office locations, one in the Washington, DC, area and two in Florida.

The specific sampling information and results, supporting these summary statements, are found in Appendix C.

## REMEDIAL EFFORTS

A detailed discussion of remediation efforts is beyond the scope of the GAO recommendations. However, it is appropriate to note that:

- ◆ All facilities suspected of contamination with *B. anthracis* were remediated (cleaned).
- ◆ The method and scope of remediation was based on sampling and epidemiological data.

A summary table of available decontamination and verification data, for facilities initially testing positive for *B. anthracis* spores, is found in Appendix C.

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## Chapter 3

# Review of Existing Information

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The workgroup analyzed available information to determine whether the risk level for postal employees had changed since earlier recommendations regarding additional sampling. This chapter summarizes observations made using existing information on epidemiology and surveillance, environmental sampling and analysis, and engineering controls and work practices put in place to reduce the risk. It also includes a summary of results from a Postal Service survey of downstream facilities that focused on implementation of the nationally required administrative and engineering controls and work practices.

## EPIDEMIOLOGY AND SURVEILLANCE

Observations made from information on epidemiology and surveillance include the following:

- ◆ Among the six cases of inhalational anthrax affecting postal workers, the mean duration between exposure and onset of symptoms was 4.5 days (range 4-6 days).
- ◆ Aside from the 2001 attacks, the longest reported incubation period from exposure to onset of clinical disease is estimated at 43 days on the basis of data from an accidental release of *B. anthracis* spores from a military microbiology facility in the former Soviet Union in 1979 (Meselson et al. 1994).
- ◆ Longer incubation periods were observed in experimental animal infection studies. The longest animal incubation period seen was 98 days after exposure (Glassman 1966; Henderson et al. 1956; Friedlander et al. 1993).
- ◆ The risk of developing a clinical case of anthrax is highest right after exposure occurs and declines afterward (Inglesby et al. 2002).
- ◆ The last known contaminated envelope was postmarked October 9, 2001, while the last case of inhalational anthrax occurred in a 94 year-old Connecticut woman, with the onset of symptoms reported on November 14, 2001.
- ◆ The FBI reported differences in the consistency of the *B. anthracis* powders used in the September and October mailings (Broad 2002; Collingwood 2002). Two possible explanations for the absence of inhalational anthrax in the postal workers in New York and Florida are that (1) the

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*B. anthracis* spore preparation in the October 9 envelopes had a higher potential for aerosolization than that in the September 18 envelopes, and (2) the two mailings were made under or exposed to different environmental conditions (e.g., different amounts of moisture) (Perkins et al. 2002).

- ◆ The Postal Service had a worker health surveillance program underway from November 2001 through April 2002. Continuous surveillance at state health departments is still ongoing. None of these organizations are finding any new cases of inhalational or cutaneous anthrax.
- ◆ More than 2 years have passed since the original contamination events occurred. The absence of a new case provides strong evidence that continuing exposure to airborne spores, or spores on surfaces, is unlikely and that current conditions present only a negligible risk. This is especially important when consideration is given to the continuous operation of the mail system and ongoing use of automated MPE that would serve as the primary means of re-aerosolization of anthrax spores in sufficient quantity to cause disease.

## ENVIRONMENTAL SAMPLING AND ANALYSIS

Once the primary anthrax response was completed in fall 2001, steps were immediately taken to improve understanding of the existing environmental sampling tools. Limited information was available to compare the accuracy and consistency of the swab and wipe surface sampling methods or any of the air sampling methods. Furthermore, while the existing methods had been previously evaluated in laboratory settings with other types of spores expected to behave similarly to *B. anthracis*, the methods had not been validated specifically for *B. anthracis* or for treated spores. At that time, the dry swab method was believed to be an acceptable method (i.e., positive results were obtained using the method). The need for comparative studies was an important priority. Therefore, in December 2001, CDC and USPS partnered to use the closed Brentwood and Trenton facilities to initiate additional studies.

The research performed to evaluate surface sampling methods involved side-by-side sampling to compare the relative effectiveness of the different methods for detecting anthrax spores. This sampling was performed at the Brentwood P&DC (renamed Curseen-Morris P&DC) and in targeted locations believed to be contaminated. The research found that dry swabs, analyzed by the CDC method, detected *B. anthracis* spores 14 percent of the time, while other sampling methods were significantly better—wet swabs detected spores 54 percent of the time, HEPA sock samples, 80 percent of the time, and wet wipe samples, 87 percent of

the time (Sanderson et al. 2002).<sup>6</sup> The swab and wipe samples were analyzed using APHL-approved procedures. These data were compiled by CDC and shared with the Postal Service, EPA, OSHA, and others in February 2002. These results led to a shift away from the use of dry swabs to the use of wet swabs, wet wipes, and HEPA sock samples. In summary, studies done after the bulk of USPS testing had been completed found that the dry swab method used in conjunction with the approved laboratory analytical technique was less sensitive than other methods to detect anthrax spores. The Postal Service incorporated this information and ceased reliance on dry swabs for sampling performed at Brentwood, Trenton, Wallingford, and other facilities undergoing remediation.

The studies referenced above were not conducted early enough and other field study research was not available to help inform the Postal Service in the choice of methods for the pre-screening sampling initiative. However, it is important to point out that (1) the need to complete the initial public health response was appropriately viewed as a higher priority than the research effort, (2) the research was performed as soon as possible, and (3) Postal Service support and cooperation were critical to completion of the expedited research.

The following items are relevant to the preceding sampling and analysis discussion:

- ◆ Approximately 48% of the 179 postal facilities addressed in the Postal Service pre-screening initiative were sampled with dry swabs before November 13, 2001. The swabs were cultured and any bacterial growth was analyzed using the PathCon Laboratories method that is somewhat different from the LRN APHL method.<sup>7</sup> It is possible that this earlier PathCon culture method involved a more efficient recovery of spores from the swab. However, no formal side-by-side studies are available.
- ◆ Dry swab testing performed at one of the facilities where employee cases occurred (Brentwood P&DC) and two facilities implicated in mail processing associated with non-employee cases (West Palm Beach P&DC and Morgan P&DC) did provide positive results.
- ◆ Most of the sampling performed at facilities with a high probability for contamination was done by methods other than dry swabs. For example,

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<sup>6</sup> The order in which samples were collected varied randomly between locations to reduce bias from nonuniform distribution of spores on surfaces. In addition, results were normalized using the size of the area sampled, so they are not simply due to the smaller areas that can be sampled by a swab.

<sup>7</sup> The PathCon method assesses dry-powder-type contamination on flat smooth surfaces, not otherwise excessively burdened with dirt and other microbial contaminants. This method was intended to provide the rapid turnaround and high volume processing required at that time. The PathCon method does not resuspend the swab for further dilution, instead it directly plates the swab onto the agar surface, specifically by rubbing the swab on the agar to dislodge spores directly on the agar. Two plates of agar media are swabbed for each swab sample analyzed (two plates per swab).

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13 facilities (4 P&DCs and 9 POs) were known to or may have processed one of the source letters.<sup>8</sup> Of those 13 facilities, only three were tested solely with dry swabs. This suggests that the facilities, where concerns would be expected to be highest, were evaluated with higher sensitivity sampling methods, thus reducing the likelihood that contamination was overlooked at the facilities where impacts were most likely.<sup>9</sup> In addition, it is recognized that the less sensitive method was used in those facilities or locales suspected to have less contamination. This issue is also addressed in Question 1 of Chapter 4.

- ◆ Much of the environmental surface sampling performed as part of the outbreak investigations by CDC (e.g., Trenton) involved wet swab methods and other methods such as wet wipes and HEPA sock samples. This sampling targeted key post offices downstream from P&DCs that processed the original contaminated letters.
- ◆ In no case was a facility “deemed to be free of *B. anthracis* spores based solely on a single negative sampling result,” during initial sampling. The lowest number of samples collected at any Postal Service facility was four, but the average was considerably higher.

In general, the Postal Service facilities that were found to have surface contamination fit an understandable pattern because they had a clear relationship to the path of contaminated mail pieces through the system. For example, contamination was most often found at the P&DCs and POs that processed the source letters. Contamination was less frequent at postal facilities directly downstream from those P&DCs and POs. Contamination at the downstream facilities was most likely caused by cross-contamination of mail. However, there were exceptions, such as the Kansas City Stamp Fulfillment Center, which cancels stamps for sale to stamp collectors. Nevertheless, even these situations could be explained. In this particular situation, some of the contaminated stamp materials had been stored in the registry cage at the Brentwood P&DC. Samples collected at Brentwood showed that spores did settle out on surfaces in this area. Thus, there was a clear relationship established and explainable pathway for this finding. These types of associations between positive findings and known exposure pathways increase the level of confidence that the main exposure pathways have been identified.

The main source of uncertainty in understanding the system-wide exposure pathways is the path of the letters sent to the Florida media company resulting in the index inhalational anthrax case. The letters were not recovered, so no postal code information was available to identify the specific P&DCs that may have been involved other than the West Palm Beach P&DC.

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<sup>8</sup> Source letters refer to those *B. anthracis*-positive, powder-containing letters associated with the anthrax attacks of 2001.

<sup>9</sup> It is not certain which of six Florida post offices was involved with processing the two letters sent to AMI, so all six were included in this category.

The following bullet items address other important environmental sampling points:

- ◆ Although not the focus of this report, ‘characterization’ is the additional sampling used to help delineate the extent and understand the spread of contamination once anthrax (or other sampling target) is identified. Based on experience from the recent anthrax attacks, many environmental sampling experts believe that characterization that is more extensive should be performed earlier in the investigative process if another attack takes place. This conclusion is a key finding in the May 2002 report of an independent peer review panel that evaluated the adequacy of the characterization performed at the Morgan P&DC in New York City (EPA 2003).
- ◆ In general, environmental surface samples were the most effective in identifying contamination, whether taken during initial assessment or characterization. While surface samples help to identify the location of contamination, without knowledge of other exposure factors they do not provide results that are directly translatable to the level of worker risk.
- ◆ No data exist on the limits of detection (i.e., the minimum concentration of anthrax spores that can be detected) for environmental sampling methods. CDC is collaborating with EPA and the U.S. Army to define such limits.
- ◆ Additional sampling would reduce, but not eliminate, uncertainty because the sensitivity of the methods used is unknown.

## ENGINEERING CONTROLS AND WORK PRACTICES

It is recognized that engineering, work practices, and administrative controls are the primary means of reducing exposure to workplace hazards. Engineering controls minimize employee exposure by either physically reducing or removing the hazard at the source, or isolating employees from the hazard. Work practices and administrative controls minimize employee exposure by altering the process in which tasks are performed or managed.

The Postal Service issued nationwide directives, requirements and guidance that formally established the following engineering controls and work practices for postal facilities:

- ◆ On October 26, 2001, the Postal Service issued “Interim Custodial Cleaning Procedures,” which eliminated the use of compressed air for all custodial cleaning. In a policy memorandum, November 1, 2001, the interim procedures were made mandatory. Compressed air was identified as a major exposure factor associated with concern for inhalational anthrax. Data collected suggest facilities are complying with the policy.

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- ◆ In these interim procedures and policy memorandum, the Postal Service replaced compressed air cleaning of sorting machines with HEPA vacuum cleaning. The daily use of HEPA vacuuming over 2½ years should further reduce any hypothetical contamination. For example, a delivery bar code sorter that was HEPA-cleaned once daily, 6 days per week from November 1, 2001, through May 1, 2004, has undergone 806 cleanings. This repetitive cleaning lowers the likelihood that resampling of machine mail paths would result in any positive findings.
  - ◆ At a teleconference held on or about October 26, 2001, the U. S. Postal Service Chief Operating Officer directed the Area Vice Presidents to have all facilities with automated MPE engage in a one-time bleach cleaning of that equipment.
  - ◆ The Postal Service developed and implemented engineering controls and new work practices to reduce potential exposure to anthrax and educate employees for improved job safety (original policy start dates are in parentheses):
    - Mandating a one-time cleaning of automated MPE with bleach and subsequent cleanings with a HEPA vacuum (October 26, 2001).
    - Custodial mopping and cleaning of workroom floors and other surfaces with wet methods using a 10 percent solution of household bleach (November 1, 2001; in effect until June 19, 2002).
    - Eliminating dry sweeping and dusting (November 1, 2001). Permission and instruction were given on the use of treated dust mops for cleaning floors and cleaning of treated dust mops with HEPA vacuums (November 13, 2001).
    - Using HEPA vacuums for custodial cleaning and cleaning of mail processing equipment (November 1, 2001); heating, ventilation, and air-conditioning (HVAC) systems (March 5, 2002); and vehicles (October 30, 2001).
    - Using HEPA vacuums and wet methods to clean high bay areas (February 28, 2002).<sup>10</sup>
    - Banning the use of personnel cooling fans (October 2001).<sup>11</sup> The ban was modified to allow for cooling fan use in delivery units, manual distribution operations, docks, trailers and non-mail

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<sup>10</sup> The Postal Service considers the “high bay” the area above the workroom floors containing exposed steel, ventilation ducts, and other building infrastructure.

<sup>11</sup> Personnel cooling fans include those mounted on ceilings, walls, pedestals or columns, as well as portable box fans and small personal fans (both 120-volt and battery-operated).

processing locations. Directing fans at automated MPE continues to be banned (February 28, 2002).

- ▶ Providing filtering facepiece respirators and gloves to employees who request them (October 16, 2001) and instructing the washing of hands with soap and water when gloves are removed and before eating (October 26, 2001).
  - ▶ Establishing “suspicious mail and powder” handling protocols (November 28, 2001).
  - ▶ Providing continuous training on emergency plans and anthrax-related subjects in mandatory safety talks (November 28, 2001).
- ◆ During the ensuing 2½ years, numerous routine operations have occurred representing potential sources of aerosol formation. These include sorting machine maintenance, machine removal, high bay cleaning, custodial cleaning, and renovation and alterations.

## VERIFICATION SURVEY FOR ANTHRAX ENGINEERING AND ADMINISTRATIVE CONTROLS

Between October 16, 2001 and June 27, 2002, the Postal Service issued nationwide directives and updated guidance and requirements documenting the establishment of the engineering controls and work practices described previously. These actions culminated in the August 2003 release of MMO-047-03, *Consolidated Policy on Custodial Cleaning*, which formalized current policy on cleaning activities for postal operations.

On the basis of preliminary totals of facilities tested, the Postal Service distributed 284 questionnaires (see Appendix D) to the tested facilities on September 5, 2003. The Postal Service sent seven more surveys to facilities identified after agencies reconciled the total. The purpose of this data call was to verify that the engineering controls, work practices, and administrative measures put in place to protect employees from anthrax exposure had actually been implemented. Of the 291 questionnaires sent out, 274 were returned.<sup>12</sup> Table 3-1 summarizes the numerical breakdown of respondents by facility type and postal area.

Table 3-2 summarizes the results of responses to each of the verification questions and reflects telephone follow-up information described in the paragraphs following the table.

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<sup>12</sup> The remaining 17 questionnaires are believed to be duplicates sent to facilities known by more than one name (such as Curseen-Morris P&DC, previously the Brentwood P&DC, and Cardiss-Collins P&DC, often referred to as Central Chicago P&DC).

*Table 3-1. Summary of Respondents to Verification Questionnaire*

Postal Area	Large Facilities with MPE <sup>a</sup>	Small Facilities with MPE <sup>b</sup>	Facilities with no MPE	Total
Capital Metro	16	5	48	69
Eastern	19	0	1	20
Great Lakes	14	1	0	15
USPS Headquarters	0	0	10	10
Northeast	10	1	1	12
New York Metro	17	13	48	78
Pacific	19	0	0	19
Southeast	18	3	4	25
Southwest	11	0	0	11
Western	12	2	1	15
Total	136	25	113	274

<sup>a</sup> Large Facilities = Plants of all types (e.g., P&DC, P&DF, BMC, and AMC).

<sup>b</sup> Small Facilities = All other facilities not considered plants (e.g., PO, branch, and station).

*Table 3-2. Summary of Results of the Verification Survey (%)*

#	Question	Yes	No	N/A
1	Was bleach used to clean floors from 11/1/01 to 6/02?	91.5	8.5	
2	Was bleach used to clean working surfaces from 11/1/01 to 6/02?	88.6	11.4	
3	Was bleach used to clean MPE from 11/1/01 to 6/02?	49.1	9.9	41.0
4	Has bleach been used routinely since 6/02?	67.3	29.0	3.7
5	Has custodial cleaning by wet methods been used continuously since 11/1/01?	95.6	4.4	
6	Has the ban on dry sweeping been enforced continuously since 11/1/01?	93.4	6.6	
7	Are HEPA vacuums used to clean MPE?	58.6	0.0	41.4
8	Are HEPA vacuums used to clean HVAC components?	76.6	4.8	19.4
9	Are HEPA vacuums used to clean vehicle interiors?	25.6	8.1	66.3
10	Are HEPA vacuums used to clean high bay areas?	78.8	1.8	19.4
11	Is the use of compressed air for cleaning banned?	84.6	0.7	14.7
12	Are Filtering Face-Piece (FFPs) masks available and provided on request?	99.6	0.4	
13	Are nitrile gloves available and provided on request?	99.6	0.4	
14	Has the "Suspicious Powder" tabletop exercise or checklist been completed?	95.6	4.4	
15	Are Emergency Action Plans up to date including employee information and training?	97.8	2.2	
16	Have Anthrax safety talks been given to employees as directed since 10/01?	100 <sup>a</sup>	0.0	

<sup>a</sup> Indicates that all facilities respond "Yes" to the question. Does not imply that 100 percent of employees received training.

The instructions for the questionnaire requested that all “No” responses be accompanied by an explanation. All responses were reviewed for completeness. All facilities that had a “No” response, either without an explanation or an explanation that did not appear relevant to the question, were contacted by telephone to complete the facility record. In addition, facilities that responded “N/A” to any question were also called to clarify the reason for their response. Facility explanations for the “No” and “N/A” responses were documented in the comments section of the summary spreadsheet. A more detailed table of comments associated with “No” responses is located in Appendix E.

As part of the quality assurance (QA) process, all responses and comments were checked for alignment and identification of improper marking. All responses that did not align with accompanying comments were changed in the summary spreadsheet and a special note made documenting the change and the reason for the change. The following is a common example of an alignment process correction:

- ◆ Question 3 was answered “N/A” with the comment that the facility had no automated MPE.
- ◆ Question 7, on cleaning automated MPE with a HEPA vacuum, was answered “Yes.”
- ◆ Question 7 was then changed to “N/A,” with a note explaining that since the facility stated it had no automated MPE, this question was incorrectly marked.

If no facility comment was included, the facility was called to identify the source of the error. In addition, if the comments indicated that a more appropriate response should have been chosen, then the response was changed and a special note included in the facility record. For example, if the responses to questions 3 and 7 were marked “No,” and the reason given was that the facility has no automated MPE, the questions were changed to the more appropriate “N/A” response. The added note explained that the question was not applicable to the facility and not an issue of noncompliance with policy.

After the QA process was completed and all responses validated, the accepted responses that facilities could use when answering questions as not applicable were summarized. These responses are shown below by question number:

- Question 3: The facility does not have MPE.
- Question 4: This question required no explanation for either a No or N/A response.
- Question 7: The facility does not have MPE.
- Question 8: Either the facility HVAC components have never been cleaned, or an outside contractor not under its control maintains the HVAC system.
- Question 9: Either the facility does not have postal vehicles, or vehicle cleaning is not the responsibility of facility staff.

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Question 10: The facility does not have high bay areas.

Question 11: The facility does not have compressed air.

During analysis of the validated responses, the decision was made to review and summarize the reasons given for answering any question with “No,” with the exception of survey question 4. A “No” response for question 4 was deemed acceptable because it is not based on a requirement of postal policy. Questions 7 and 16 did not have any “No” responses, but all other questions had at least one “No” response relating to a postal requirement. An analysis of these responses uncovered three common themes:

- ◆ Facility management was not familiar with the applicability of a policy or requirement.
- ◆ The rule was not applicable to their operations.
- ◆ Alternative cleaning methods were chosen.

See Appendix E for more detail on all data presented in this section.

These engineering controls and work practices have been, and continue to be, implemented in postal facilities, and their ongoing use will further reduce any potential exposure that might remain. In addition, every facility that reported a “No” response was further evaluated, and only a small number required contact to ensure that Postal Service policies were understood and being followed.

# Chapter 4

## Conclusions

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### REVIEW OF THE BASIC RISK QUESTIONS

This section uses the environmental sampling results, engineering controls and work practices, and epidemiology data to answer the hypothetical risk questions asked in Chapter 1.

#### Question One

*Aside from the postal facilities already identified, what is the likelihood that other postal facilities or locations were contaminated via cross-contaminated mail in fall 2001?*

An estimated 85 million mail pieces were processed on the days after the *B. anthracis*-containing envelopes passed through the Trenton and Brentwood P&DCs until they were closed (Lustig et al. 2001). Some of the mail pieces that passed through these two facilities could have been cross-contaminated and, in turn, could have contaminated MPE or other mail processed in other downstream facilities. Therefore, it was likely that several facilities were contaminated. Sampling was performed both as part of the outbreak investigations and to target those postal facilities receiving 1 percent or more of their mail stream from the Trenton and Brentwood P&DCs. These sampling efforts served to effectively target the downstream facilities most likely to have been affected from cross-contamination.

Available information suggests that the likelihood of contamination was not equivalent among all potential postal facilities. The likelihood of contamination was highest in facilities through which one of the source letters actually passed. Thirteen facilities (four P&DCs and nine POs) fit this requirement. Most of the sampling performed at facilities with a high probability for contamination was done by methods other than dry swabs. Ten of the facilities were sampled using either wet swabs or wet wipes, while three of these facilities were sampled with dry swabs. All three were New York City post offices associated with the September 2001 letters to the news media outlets, but not linked to any inhalational anthrax cases. Given the overall epidemiological findings associated with the news media outbreaks, the risk of inhalational disease at these three facilities was considered negligible. Several of the remaining facilities in this category were extensively sampled to verify the effectiveness of remediation.

The next highest likelihood for contamination included those facilities known to have processed a cross-contaminated letter or considered directly downstream from one of the four P&DCs that actually processed one of the source letters. All

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post office facilities directly downstream from the Brentwood and Trenton P&DCs were sampled. Not all post office facilities downstream from the Morgan Station and West Palm Beach P&DCs were sampled, but those that were most likely to have been contaminated were sampled. Of the 97 facilities in this group, only the four post offices related to the New York news media outbreak were sampled with dry swabs. The overall epidemiological findings from the New York news media cases suggest that the risk of inhalational disease at these facilities is negligible.

The remaining postal facilities are viewed as having the lowest likelihood of cross-contamination among the targeted facilities. They have some unknown likelihood of contamination because they received more than 1 percent of their mail stream from the Trenton P&DC. The 167 facilities in this category were all sampled with dry swabs.

In retrospect, it is now recognized that the dry swab sampling method is less sensitive than other methods. However, in making the determination whether to re-sample facilities, sampling methods cannot be the only criteria. Other factors, such as the likelihood of having been contaminated, the epidemiological data, and the effective implementation of engineering controls, must be factored into the evaluation. This workgroup has discussed these factors and considered each of them in arriving at their final conclusions. In addition, the Postal Service has adopted the use of the most current environmental anthrax sampling protocols as referenced in the Technical Assistance Document guidance.

## Question Two

*Given that the Postal Service has taken measures intended to clean locations that were most likely to have been contaminated, what is the likelihood that the spores remain if undetected contamination occurred?*

*B. anthracis* spores are described as “hardy” and have been known to survive for decades under specific conditions, if they are left undisturbed (Williams 1986). However, implementation of the engineering controls and work practices, as described below, greatly reduce the likelihood that spores introduced into postal facilities remain available for potential worker exposure. Custodial maintenance procedures at postal facilities were modified in November 2001 to include the use of bleach to clean machines, work surfaces, and floors. In addition, facilities with automated MPE were instructed to implement a minimum one-time bleach cleaning of their automated MPE. Many of the facilities chose to repeat the bleach cleaning procedure so that machines and other work surfaces were subjected to regular bleach treatments over 6 months. In addition, machine surfaces, including internal workings, have undergone repeated daily HEPA vacuuming. The cumulative effect of these treatments is that the mail path surfaces that were most likely cross-contaminated have undergone hundreds of cleanings. The result is a very low likelihood that spores remain on surfaces that have been most closely associated with potential worker exposures. Responses to the questionnaire distributed

as part of this review provide information about the use of these precautions and identified only a few facilities where follow-up was needed to ensure that Postal Service policies were understood and being followed.

## Question Three

*If these hypothetical undetected spores are still present in a facility, what is the likelihood that secondary aerosolization can still occur?*

If spores remain in a postal facility despite the numerous repeated cleanings, they could present a potential risk to employees, but that risk depends on the occurrence of an exposure. Direct contact with the skin could occur and potentially pose a concern for cutaneous anthrax. In this hypothetical situation, secondary aerosolization is a prerequisite for any inhalational anthrax risk. Various modifications in postal operations and maintenance procedures have reduced the potential for secondary aerosolization. The most important change is eliminating the use of compressed air to clean postal machinery. This practice was banned in November 2001 and replaced with HEPA vacuum cleaning. Additional changes relevant to reducing or eliminating re-aerosolization include banning dry sweeping methods and substituting them with wet cleaning methods, and modifying the procedures for use of cooling fans.

The routine operation of mail sorting machines and performance of maintenance and cleaning activities could also re-aerosolize any surviving spores. However, the current risks are negligible for two primary reasons. First, mail has been processed at these facilities for over 2½ years without any additional anthrax cases, which strongly suggests that continued operation of the machines does not present any significant ongoing exposure from the 2001 attack. Second, the considerable passage of time means that other less common activities, which could contribute to re-aerosolization, have also had opportunity to occur without incident. Those activities include less frequently scheduled operations such as cleaning the high bay rafters and air ducts in facilities with overhead spaces and dismantling and replacing parts on MPE. Thus, it is likely that a full range of routine aerosol generating activities have occurred without adverse consequences over the past 2½ years, providing additional reassurance that current risks are negligible.

The workgroup evaluated potential upcoming and new operational developments for sources of aerosol generation. However, none were identified.

## Question Four

*If secondary aerosolization were to occur, what is the likelihood that it would result in sufficient employee exposure to cause disease?*

The case information for anthrax suggests that primary aerosolization is most strongly associated with exposures leading to inhalational anthrax (Meselson et al. 1994; Inglesby, et al. 2002). Primary aerosolization could be a single event, such

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as the opening of a spore-filled letter, or a series of related events, such as those associated with the processing of a letter through a P&DC (machine sorting, machine cleaning, and manual handling and riffling) (Dewan et al. 2002). Secondary aerosols result from disruption and resuspension of settled particles. Through agglomeration to other spores or debris or other changes, these settled particles may not maintain the characteristics of the original material (Baron and Willeke 2001). As a consequence, resuspension may result in larger-diameter particle aerosols and lower airborne concentrations, both of which reduce the risk of exposure when compared to the primary event.

More than 2½ years have passed since the original events and the implementation of various Postal Service engineering and administrative controls, as described earlier. These steps are expected to have reduced both the presence of spores and the opportunities for re-aerosolization. The cumulative impact of these measures makes it increasingly unlikely that re-aerosolization of residual spores could still occur and lead to a significant exposure. Data show that all of the postal inhalational anthrax cases occurred around the initial aerosol events, with no new cases occurring since November 2001. The lack of any new anthrax cases provides reassurance that the risk of developing disease due to the exposure to any residual spores is negligible and decreases as time passes.

The Postal Service is planning that the Ventilation and Filtration System (VFS) program, which is designed to protect employees and the public from future anthrax attacks, also serve to further reduce any future exposures. The new controls will capture aerosols as they are created during processing and thereby reduce employee exposures.

## Question Five

*If employee exposure and illness were to occur as a result of the above steps, what is the likelihood that timely treatment would be provided?*

Because of the increased national awareness about anthrax and its health threat among workers, employers, physicians, and local and federal agencies, there is a high likelihood that any future disease manifestation would be recognized and treated early. This quick response also serves to reduce the overall risk of the disease progressing.

## RESPONSES TO GAO RECOMMENDATIONS

This section presents the Postal Service's responses to the GAO recommendations of May 19, 2003, concerning the anthrax attacks of 2001. In accordance with those recommendations, the CDC, EPA, OSHA, and postal unions helped develop these responses. The listed agencies, the Postal Service, and the mail handler's, city and rural letter carrier's unions also concur with the conclusions presented in

this report. The APWU reviewed and provided comments concerning those same conclusions.

## Recommendation One

*Reassess the risk level for postal workers at those facilities and the general public served by those facilities.*

The workgroup reassessed the risk by evaluating the key epidemiological, environmental sampling, and engineering and work practice control issues. The totality of available information leads the workgroup to conclude that current residual risks from the 2001 attacks are negligible.

At the outset, GAO stated, “even though the health risk is probably low, it is uncertain” (GAO 2003). After a systematic look at the key exposure and risk factors, the workgroup is confident that the risks are negligible. However, since reliable quantitative risk estimates are still not possible at this time, the level of risk remains uncertain. GAO had also requested that the reassessment of risk focus on those facilities that had been “deemed to be free of anthrax spores based solely on a single negative sampling result” (GAO 2003). The workgroup found that no facilities fell into this category; nonetheless, it reassessed all relevant Postal Service facilities.

It is not technically accurate to state that negative sampling results can prove that a facility is free of anthrax spores and thus free of exposure risk. The possibility that some residual and undetected spores remain in a postal facility, despite numerous cleanings, cannot be ruled out. Neither can the possibility be ruled out that undetected residual spores, from the anthrax attacks of 2001, exist outdoors somewhere along the East Coast. However, the lack of any new cases, in either postal workers or the public, over the ensuing 2½ years provides strong evidence that the number of residual spores is low or that conditions no longer exist to aerosolize the spores and create harmful exposures. Because these ongoing epidemiological results reflect both retrospective and current conditions, the workgroup tried to identify any new developments that might provide a new pathway of concern for aerosol formation. The only potential concerns, for hypothetical aerosol formation, might be associated with unusual (such as a facility demolition) or catastrophic events (e.g., earthquake or fire). The workgroup assumes that these types of events will be rare and involve other conditions that would offset any increased risk such as facility exposure to adverse weather conditions or temporary employee relocation during repair.

## Recommendation Two

*Reconsider the advisability of retesting those facilities and employing the most effective sampling methods and procedures.*

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On the basis of the finding of negligible risk to postal employees and the public, the workgroup concluded that further sampling in postal facilities is not indicated at this time. The basis for this conclusion includes the following:

- ◆ The extensive risk-based, mail path sampling and analysis process
- ◆ The implementation of effective facility decontamination procedures
- ◆ The development and implementation of engineering, work practice, and administrative controls
- ◆ Over 2½ years of continuous operation without a new anthrax case or epidemiological evidence of any anthrax-related disease.

Although the sampling methods used to screen Postal Service facilities had limitations, the workgroup recognizes that these limitations alone are not sufficient justification for a resampling effort. Sampling is a valuable tool and played an important role during the response to the anthrax attacks of 2001, but it also was used in concert with epidemiological information and new engineering controls.

The incremental improvement of sampling methods is a normal ongoing process, but that does not mean that all previous sampling needs to be continually repeated using newer methods. For example, the methods used for post-remediation clearance sampling for the Brentwood P&DC incorporated improvements not found in those used earlier for the clearance sampling at the Capitol Hill buildings. The current methods also need additional evaluation to determine the limits of detection. CDC, EPA, and the military are striving to develop this information, but it is not yet available.

## Recommendation Three

*Communicate to the postal workers and the general public the results of the reassessment of health risk, the advisability of retesting, the rationale for these decisions, and other relevant information that may be helpful regarding the health of the postal workers and the general public.*

The Postal Service, in consultation with the workgroup, has prepared a communication plan to share this report with its employees and the general public. Through its revised anthrax guidelines, the Postal Service will make the latest information on sampling and analysis for anthrax available to employees and the public.

The Postal Service will communicate its findings to key audiences:

- ◆ General Public
  - A press release will be issued to all industry and general media.

- The press release will be posted on [www.usps.com](http://www.usps.com), as a general press release and in the “Security of the Mail” section.
- The press release will be adapted as a story for the daily *USPSNews-Today* and posted on [www.usps.com](http://www.usps.com).
- ◆ Employees
  - *Newsbreak*, an employee communication vehicle, will be sent by e-mail and fax to all Postal Service facilities.
  - *Newsbreak* content will be distributed as a mandatory “Stand-Up Talk”—or employee briefing—through the operational communications channel.
  - In addition, *Newsbreak* content will be adapted and incorporated into the following:
    - *USPSNewsLink*, a daily, electronic newsletter with an audience of 150,000 employees
    - A question and answer format for *USPSNewsTalk*, a weekly electronic newsletter sent to 12,000 postmasters and supervisors
    - *USPS News HardCopy*, a biweekly broadsheet news vehicle posted in break areas at all 38,000 Postal Service facilities
    - A standalone video *Newsbreak*, to be broadcast on our internal television network (USPS TV) and into the biweekly news broadcast
    - A series of screens on *Postal Vision*, an internal, video-based news source, available in 625 of the largest Postal Service facilities, which reaches more than half of the workforce
    - In each of the nine monthly *Area Updates*, an in-home employee magazine.

The Postal Service will continue to work with the agencies that consulted on this report and postal unions to ensure the protection of our employees and the mail infrastructure of the United States from bioterrorism and other emergencies.

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# Appendix A

## Postal Service Sampling Strategy: A

### Chronology

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This table of events presents the changes in sampling methods used by the Postal Service during the 2001 anthrax incidents. It is the best available compilation of information and not intended as a comprehensive chronology of events. The actions presented were taken by the Postal Service in consultation with other cognizant federal agencies and represent the best available and recommended technologies at the time of their use.

Action	Date	Justification
Sampling conducted by EPA at Florida facilities	October 16, 2001	Follow the targeted mail upstream from AMI facility
Sampling conducted by Postal Service contractor at Brentwood P&DC	October 18, 2001	Follow the targeted mail through the plant
Sampling conducted by Postal Service contractor at Morgan P&DC	October 21, 2001	Follow the targeted mail through the plant
Sampling targeted to 14 facilities in the Postal Service	October 26, 2001	Focus on suspect mail sites within the Postal Service network
Sampling protocols developed with 100 percent RAPID™ and 100 percent culture backup samples; sampling protocols changed later on same day to 100 percent RAPID™ with 10 percent culture backup. All samples taken using wet swabs	October 26, 2001	Establish sampling procedures for suspect hubs
Expanded guidance on sampling procedures to reflect CDC experience in NJ, NY, and FL	October 27, 2001	Ensure CDC and Postal Service are sampling in a unified, consistent manner using best available science.
CDC issues draft sampling guidance with input from Postal Service	October 28, 2001	Ensure unified and consistent approach to sampling by Postal Service and CDC
Sampling protocols revised to 100percent RAPID™ and 50percent culture samples. All samples taken using wet swabs	October 29, 2001	Establish revised sampling procedures that were more time efficient with additional statistical rigor
A total of 33 samples established for pre-screening program	October 31, 2001	Establish standard sample number and location for mail trail sampling protocol
Sampling targeted on 27 facilities and 232 pre-screening sites	November 1, 2001	Expand focus beyond suspect locations to include other potential downstream facilities for pre-screening
Insufficient reagent available for RAPID™; Weston and IT continue using RAPID™; URS, send samples for plating to PathCon Laboratories.	November 2, 2001	Establish revised sampling procedures to address limited resources to support RAPID™ device

Action	Date	Justification
Expanded sampling locations from 32 to 40 locations within each plant	November 3, 2001	Ensure more effective coverage of the typical processing and distribution facility—CDC input.
Expanded sampling locations from 40 to 48 locations	November 4, 2001	Ensure more effective coverage of typical plant
Expanded sampling to a minimum of 55 samples plus 10 discretionary samples; went to 100percent culture samples with DPRA, IT, Earth Tech, Weston and URS; At same time, IT and Weston also continued RAPID™ sampling; decision made to send all sample for plate culturing to state laboratories	November 5, 2001	To ensure more effective coverage of typical plant. To ensure existing field RAPID™ equipment was optimally utilized and each contractor was capable of delivering sampling services within their capacities
Revised thinking on RAPID™ device after conference call with U.S. Army Medical Research Institute of Infectious Diseases	November 6, 2001	PCR field instruments found to have significant false positive (>20percent) and false negative readings (>10percent) when used by inexperienced staff
Created letter of agreement with APHL to provide lab support services; decision made to stop using RAPID™ in screening protocol	November 7, 2001	The CDC was incapable of continued analytical support to national Postal Service sampling program; USAMRIID information indicates RAPID™ not suitable for environmental screening
Revised sampling protocols to establish dry swab method based on APHL procedural guidance	November 8, 2001	Sampling procedure used by contractors must be consistent with state health laboratory capabilities and protocols
RAPID™ sampling stops in screening program for downstream facilities	November 9, 2001	Device not effective for use in environmental samples of suspect cross-contaminated facilities
Sampling procedures standardized and implemented amongst all contractors	November 10, 2001	Contractors were developing individual relationships with state labs, which created logistical challenges for the Postal Service
Sampling collection procedures standardized	November 11, 2001	CDC suggests that Postal Service and CDC collect data in standard format
Standard sample data collection form created	November 12, 2001	APHL, Postal Service and USACOE create standard report format
Standard report format created	November 13, 2001	Finalized standard report format to ensure consistent delivery of information across Postal Service areas
Draft Sampling Procedures issued for 186 Review based on a minimum of 55 samples for pre-screening program	November 16, 2001	Standardized procedure for pre-screening program reflecting input from national unions, CDC, OSHA, APHL, USACOE and Postal Service staff

# Appendix B

## Anthrax Pre-Screening Sampling Strategy

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This appendix presents an excerpt from the anthrax guidance document, Chapter 2.

### **“2-1 Anthrax Pre-Screening Sampling Strategy for U.S. Postal Service Facilities**

Sites to be pre-screened are selected using the current knowledge of the overall anthrax threat to U.S. Postal Service facilities.

The U.S. Postal Service is conducting sampling and analysis of processing and distribution centers and facilities to determine whether *Bacillus anthracis* is present in these facilities. This decision is consistent with guidance developed by the U.S. Occupational Safety and Health Administration (OSHA) that helps determine appropriate actions concerning anthrax in the workplace (see [www.osha.gov](http://www.osha.gov)). OSHA suggests the following:

- a. Green Zones are workplaces where anthrax contamination is unlikely.
- b. Yellow Zones are workplaces where anthrax contamination is possible.
- c. Red Zones are workplaces where anthrax has been confirmed or is strongly suspected.

U.S. Postal Service mail processing facilities and Post Offices are identified as Yellow Zones since these sites have the potential to be contaminated by anthrax. The pre-screening initiative discussed below is intended to identify whether these Yellow Zone facilities are contaminated (i.e., Red Zone facilities) or are free of anthrax.

See guidelines for developing an environmental sampling strategy in sections 2-1.2 and 2-1.3.

#### **2-1.1 Employee Notifications**

Before any sampling is undertaken, all employees are to receive a safety talk on the pre-screening sampling initiative from the facility manager. Appendix A contains basic information on the pre-screening sampling initiative for use by facility managers. Appendix B contains questions and answers for pre-screening sampling at sites where there is no known contamination. The delivery of this safety talk is to be coordinated with union representatives and a medical representative and/or safety specialist should be in attendance at that time.

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## 2-1.2 Guidelines for Developing an Environmental Sampling Strategy

Because each facility is different, it is not possible to provide a single comprehensive strategy that can address every unique situation that may arise. Therefore, field teams that conduct the sampling should apply these guidelines as each situation dictates. The general principles presented in these guidelines are based on the experience of CDC field teams that conducted sampling for *Bacillus anthracis* in a number of mail-handling facilities.

The overall sampling strategy at a minimum should consider the following criteria:

- a. Size of the facility.
- b. Volume and flow of mail through the facility.
- c. Steps involved in processing mail.
- d. Well-established principles and practices of industrial hygiene.

Pre-qualified environmental contractors have been retained by the U.S. Postal Service to perform the required sampling, laboratory analysis, and to submit results of those analyses. These contractors are managed by the U.S. Postal Service Unified Incident Command Center in Washington, DC and are the only contractors authorized to undertake pre-screening sampling within the U.S. Postal Service. These contractors are to be provided with information concerning the mail processing and transportation history of targeted mail pieces and logistics information that may shed light on potentially exposed employees. The professional judgment of the sampling team leader is essential to the final determination of where and how samples are collected. The sampling team leader will use Table 1, Guidelines for Pre-Screening Sampling, to determine where and how much to sample.

Where multiple pieces of equipment exist, a random selection is made for analysis. Select up to 10 discretionary areas with input from the facility manager and union representatives. Up to 10 additional samples are to be collected (i.e., beyond the minimum number of samples per facility) for each 100,000 square feet of gross interior space in any facility with more than 300,000 square feet of gross interior space.

Table B-1. Guidelines For Pre-Screening Sampling

<i>If sampling this location...</i>	<i>Take at least this number of samples...</i>	<i>At your discretion, take this number of additional samples...</i>	<i>On these surfaces...</i>
<b>Mail Processing Areas</b>			
<i>Inbound docks</i>	3	<i>1 per 5,000 square feet</i>	<i>Floor surface (1), Electrostatic (ES) area (1)</i>
<i>O10 operation</i>	3	<i>Discretionary</i>	<i>Conveyor (1) Belt (1), Electrostatic (ES) area (1)</i>
<i>Advanced facer canceller system</i>	3	<i>Discretionary</i>	<i>Jogger (1) Stacker (1), Electrostatic (ES) area (1)</i>
<i>Optical character readers or bar code sorters</i>	3	<i>Discretionary</i>	<i>Jogger (1) Stacker (1), Electrostatic (ES) area (1)</i>
<i>Delivery bar code sorters</i>	3	<i>1 per 10 units (10%)</i>	<i>Jogger (1), Reject panel (1), Electrostatic (ES) area (1)</i>
<i>Flat sorters</i>	3	<i>1 per 10 units (10%)</i>	<i>Jogger (1), Electrostatic (ES) area (1)</i>
<i>Small parcel bundle sorters</i>	3	<i>1 per 10 units (10%)</i>	<i>Random selection of mail flow surfaces Electrostatic (ES) Area (1)</i>
<i>Carrier cases</i>	3	<i>1 per 10 cases (10%)</i>	<i>Random case selection</i>
<i>Outbound docks</i>	3	<i>1 per 5,000 square feet</i>	<i>Floor surface (1), Electrostatic (ES) area (1)</i>
<i>Mail transport equipment</i>	6	<i>Discretionary</i>	<i>Beginning mail flow (3), End (3)</i>
<b>Building and Maintenance Areas</b>			
<i>Maintenance areas</i>	2	<i>Discretionary</i>	<i>Vacuum equipment bag (1)</i>
<i>Administrative areas</i>	3	<i>1 per 10% of total square footage of administrative area to total area of facility</i>	<i>Random selection with bias toward computer keyboards, postal mailrooms, and light fixtures</i>
<i>Return air vent filters</i>	3	<i>1 per 10 return air vents (10%)</i>	<i>Filter media (3)</i>
<i>Intake Vent</i>	3	<i>1 per 10 return air vents (10%)</i>	<i>Surface sample (3)</i>
<i>Discharge Vent</i>	3	<i>1 per 10 return air vents (10%)</i>	<i>Surface sample (3)</i>
<i>HEPACON filters (if applicable)</i>	1	<i>Discretionary</i>	<i>Filter media (1)</i>
<b>Lobby and Customer Areas</b>			
<i>Collection boxes (outside facility if applicable)</i>	2	<i>Discretionary</i>	<i>Outside surface of mail slot receptacle</i>
<i>Public areas such as lobbies (if applicable)</i>	2	<i>Discretionary</i>	<i>Surfaces-service counters (1) Lobby table (1)</i>
<i>Post Office boxes, from inside</i>	3	<i>Discretionary</i>	<i>The back side of Post Office box section</i>
<b>Total</b>	55	10	

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### **2-1.3 Describing Building Layout and Mail Flow in the Facility**

The sampling team leader should obtain a floor plan or schematic of the facility and a mail-flow diagram to identify potential sampling locations. The team leader should meet with the maintenance manager and/or electronic technician for the facility and identify specific electrostatic charged areas to be sampled on the machines. The building schematic should identify the following:

- a. Mail entry and exit points.
- b. Location and types of equipment in the facility.
- c. Areas or locations where workers handle the mail.
- d. Ventilation system showing the location of air intake and discharge vents.
- e. Location of mail collection boxes at the site or mail drops in the retail lobby area (where applicable).

Note: The sampling team leader should check with the laboratory performing the test to ensure that the sampling procedure is compatible with the requirements of the laboratory analysis established by the CDC and the Association of Public Health Laboratories (APHL) state laboratory network. Sampling team leaders should conduct a visual inspection of all potential sampling locations prior to the actual sample collection to facilitate equipment preparation requirements (e.g., lockout/tagout, pre-sample container labeling, etc.) The location where environmental samples are obtained should be mapped on the facility floor layout plans.

#### **2-1.3.1 Initial Sampling Strategy**

Regardless of facility size, the initial sampling strategy should generally be designed to obtain samples from the following:

- a. A location in the initial sorting and handling step. For example, in a larger facility, this initial step occurs at the Dual Pass Rough Cull (DPRC) (also known as Barney) machine. At the smallest facilities, initial sorting is done manually.
- b. A location in the next sorting and handling step. For example, in a larger facility, the next step may be one of the following:
  - (1) Advanced facer canceller system (AFCS).
  - (2) Flat sorting machine (FSM).
  - (3) Small parcel and bundle sorter (SPBS).
- c. HVAC intake and discharge outlet that cleans and re-circulates air for that portion of the building where the equipment listed in items a. and b. of this section.
- d. The equipment used to maintain and clean the sorting machines (e.g., vacuum cleaners and brooms).
- e. Tables, Post Office box surfaces, and service counters in the public area.

- 
- f. Mail collection box receiving bins on the grounds of the facility and mail drops in the retail lobby (where applicable).
  - g. Several work surfaces selected randomly from manual sorting areas.
  - h. Several workstation samples selected randomly which are associated with automation equipment (see items a and b of this section and from other surfaces, such as carrier cases or time clocks) that employees may have touched.
  - i. Areas that accumulate electrostatic charges are to be sampled as part of each sampling area. For example, when samples are taken on a small parcel and bundle sorter, at least one sample is to be taken from the transformer area. See Table 1, Guidelines for Pre-Screening Sampling, for specific locations where electrostatic area samples are to be taken. For further information on electrostatic areas, contact the maintenance manager or electronic technician for the facility.
  - j. Distinct sampling will be provided in the case of segregated mail streams within a facility (i.e., government versus nongovernment mail).
  - k. The sampling strategy should be designed to collect representative samples from work areas and mail transport equipment.

### **2-1.3.2 Pre-Screening Sampling and Analysis Plan**

Contractors are to develop a written, site-specific pre-screening sampling and analysis plan prior to collecting any samples. The sampling and analysis plan is to be consistent with the guidelines contained in this section, as well as policies and procedures developed by the CDC and the APHL. In addition, it is recommended that the sampling team leader consult with the maintenance managers to identify areas where dust, dirt, and debris typically accumulate within the facility and on or in the equipment. This will ensure that the sampling analysis plan reflects site-specific concerns that might not otherwise be obvious to the sampling team leader.”

# Appendix C

## Anthrax Testing Data

This appendix presents the sampling, testing, and decontamination/verification data that the Postal Service, CDC, EPA, and FBI collected.

*Table C-1. Downstream Sampling by Postal Service and Government Agencies*

Testing effort, date, and testing organization	Number of downstream facilities tested by type	Type of sampling	Number of positive locations
AMI/West Palm Beach Postal Service/EPA	N=7 ◆ 1 P&DC/PO ◆ 6 POs	Wet swabs, dry swabs, some wet wipes, some HEPA socks  N=38 Postal Service, N=228 EPA/CDC	1 P&DC 5 POs
Trenton outbreak investigation 10-11/01 CDC/NJDOH/Postal Service/FBI	N=57 (54 Postal Service, 3 Other) ◆ 2 P&DCs ◆ 51 POs ◆ 1 transfer station ◆ 3 Other	Wet swabs and some HEPA socks  N=1340	2 P&DCs 5 POs
Postal Service Pre-Screening survey 11/01 Postal Service	N=179 ◆ 109 P&DCs ◆ 22 POs ◆ 48 Other	Dry swabs, wet swabs, RAPID™ PCR  N=6,841	4 P&DCs 2 other
New York City media investigation/Morgan P&DC Postal Service, CDC	N=5 ◆ 1 P&DC and 4 POs for Media	Dry swabs  N= 148 Postal Service, N= 56 CDC at Morgan P&DC  N=38 at POs—CDC	1 P&DC
New York City hospital worker investigation and Bronx P&DC CDC	N=5 ◆ 1 P&DC and 4 POs for Hospital Worker	Dry swabs  N= 25 at Bronx P&DC N= 41 at POs  HEPA socks N= 3 at POs	None
Brentwood Postal Service, CDC	N=45 ◆ 1 P&DC ◆ 44 POs	Wet swabs, HEPA socks, air samples, dry swabs  N= 165 CDC, (29) Postal Service at Brentwood; 534 at 44 POs, other—CDC	1 P&DC 4 POs

Table C-1. Downstream Sampling by Postal Service and Government Agencies (cont.)

Testing effort, date, and testing organization	Number of downstream facilities tested by type	Type of sampling	Number of positive locations
Additional sampling conducted as continuation of Trenton investigation—Trenton West Dock, South River, Princeton mail consolidation areas; Kilmer and Monmouth P&DCs Postal Service	N=5 ◆ 2 P&DC ◆ 3 Other	HEPA socks N=75	None
Southern CT P&DC, Wallingford, CT and Seymour, CT PO Postal Service, CDC	N=2 ◆ 1 P&DC ◆ 1 PO	Wet wipes, HEPA socks, dry swabs N=412 at P&DC, 41 at PO, CDC; 117 Postal Service at P&DC and 29 at PO	1 P&DC
Targeted sampling Wallingford, CT P&DC (High Bay) Postal Service	N=1 ◆ 1 P&DC	HEPA socks N=64 Postal Service/URS	3 positive samples in high bay areas
Southern NJ P&DC, Bellmawr, NJ FBI	N=1 ◆ 1 P&DC	Unknown—FBI	1 positive sample (CRT station)
Court ordered sampling—Southern NJ P&DC, Bellmawr, NJ Postal Service—quarterly for 2 years	N=1 ◆ 1 P&DC	HEPA socks N=82	None

Note: The 23 facilities listed in Table C-2 share a corresponding position on Table C-3, which presents their decontamination and verification information.

*Table C-2. Data on Positive Facilities*

Facility	Type of sampling	Number of samples	Number of positives results	Agency/group that collected samples	Most likely explanation for contamination?
West Palm Beach PO, P&DC	Dry swabs Wet swabs	URS -38 EPA/CDC—124	URS—1 EPA/CDC—7	Postal Service/URS EPA/CDC	Potential AMI letter route
Blue Lake DDC	Wet swabs HEPA socks	30 8	1	EPA/CDC	Cross-contaminated mail from West Palm Beach P&DC
Boca Raton PO	Wet swabs	37	1	EPA/CDC	Cross-contaminated mail from West Palm Beach P&DC
Greenacres PO	Wet swabs, some wet wipes, some HEPA socks	32	2 [NIOSH stated on 10/20/03 that there should only be 2 positives, rest (10) thought to be cross-contaminated samples	EPA/CDC	Cross-contaminated mail from West Palm Beach P&DC
Lake Worth PO	Wet swabs Wet wipes	5 4	2	EPA/CDC	Cross-contaminated mail from West Palm Beach P&DC
Lucerne PO	Wet swabs	20	1	EPA/CDC	Cross-contaminated mail from West Palm Beach P&DC
Trenton P&DC	Wet swabs Wet wipes HEPA socks Air (using a variety of methods)	94 106 7 255	43 106 Unknown 131	CDC—NJDHSS	Initial processing of spore-containing letters
Jackson Main PO	Wet swabs	23 24	14 1	FBI CDC—NJDHSS	Cross-contaminated mail from Trenton P&DC

Table C-2. Data on Positive Facilities (cont.)

Facility	Type of sampling	Number of samples	Number of positives results	Agency/group that collected samples	Most likely explanation for contamination?
Princeton PO	Wet Swabs	23	1	FBI	Cross-contaminated mail from Trenton P&DC
		14	0	CDC—NJDHSS	
	HEPA socks	8	0	CDC—NJDHSS	
Princeton–Palmer Square Station PO	Wet swabs	19	1	CDC—NJDHSS	Cross-contaminated mail from Trenton P&DC
Rocky Hill PO	Wet swabs	15	1	CDC—NJDHSS	Cross-contaminated mail from Trenton P&DC
Southern NJ P&DC, Bellmawr, NJ	Wet swabs	40	1—CRT station	FBI	Cross-contaminated mail from Trenton P&DC
Trenton Station E PO	Wet swabs	18	1	CDC—NJDHSS	Cross-contaminated mail from Trenton P&DC
Brentwood P&DC	Dry swabs,	29	14	Postal Service— URS CDC	Processed spore-containing letters
	Wet wipes,	114	8		
	HEPA socks	39	27		
	air samples;	12	0		
	Sanderson study: Dry swabs	28	4		
	Wet swabs	67	36		
	HEPA sock wet wipe	64	51		
	67	58			
Dulles PO	Wet swabs	12	1	CDC—IT	Cross-contaminated mail from Brentwood
Friendship Station PO	Wet swabs	41	1 (composite of two swabs)	CDC—IT	Cross-contaminated mail from Brentwood
Pentagon Station PO	Wet swabs	17	2	CDC—IT	Cross-contaminated mail from Brentwood

Table C-2. Data on Positive Facilities (cont.)

Facility	Type of sampling	Number of samples	Number of positives results	Agency/group that collected samples	Most likely explanation for contamination?
Raleigh P&DC	Dry swabs	42	1	Postal Service—IT	Stamp stock moved from Brentwood. Original location adjacent to contaminated machines at Brentwood
Southwest Station PO	Wet swabs	20	1	CDC—IT	Cross-contaminated mail from Brentwood
Morgan Station P&DC	Dry swabs	148 56	4 7	Postal Service/URS CDC/NIOSH	Processed spore-containing letters
Indianapolis Parts & Maintenance (6 others)	Dry swabs	44	1	Postal Service—URS	Contaminated parts from Trenton and Brentwood P&DCs
Kansas City Stamp Fulfillment Services	Dry swabs	28 (includes two duplicate samples)	1 (one sample and duplicate)	Postal Service—URS	Cross-contaminated mail (first date covers/stamp stock) from Brentwood P&DC
	Wet swabs	54	0	CDC/NIOSH - [inserted per telecon with NIOSH 10/20/03]	
Southern CT P&DC, Wallingford, CT	Dry swabs Wet swabs Wet wipes HEPA socks	Postal Service—117 CDC—102 CDC—200 CDC- 110	0 4 35 2	Postal Service—Weston (53), Earth Tech (64); CDC/NIOSH	Cross-contaminated mail from Morgan Station and Trenton P&DCs

*Table C-3. Decontamination/Verification Data on Positive Facilities*

Facility	Type of decontamination procedure and what was decontaminated	Agency/group performing decontamination	Type/number of verification samples	Agency/group performing verification sampling	Clearance date/procedure and agencies involved
West Palm Beach PO, P&DC	0.5% bleach solution*; decontaminated sorting machines, hot boxes, and peripheral areas	USEPA, ATSDR, CDC/NIOSH, USCG	Wet Swab. 23 samples collected from previously contaminated and suspect areas on 10/30/01 and 11/03/01	USEPA and Superfund Technical Assessment and Response Team (START) contractor	Presented data to Dr. Malieki, West Palm Beach Health Department, for acceptance
Blue Lake DDC	Removal of contaminated shop vacuum	USEPA, IT Corporation (USEPA Contractor)	None; all pre-decontaminated samples were negative except for removed vacuum	USEPA and START	Presented data to Dr. Malieki, West Palm Beach Health Department, for acceptance
Boca Raton PO	0.5% bleach solution*; decontaminated sorting machines, hot boxes, and peripheral areas	USEPA, ATSDR, CDC/NIOSH, USCG	Wet swab; 22 samples collected from previously contaminated and suspect areas on 10/15/01	USEPA and START	Presented data to Dr. Malieki, West Palm Beach Health Department, for acceptance
Greenacres PO	0.5% bleach solution*; decontaminated sorting machines, hot boxes, and peripheral areas	USEPA, ATSDR, CDC/NIOSH, USCG	Wet swab; 2 samples collected from the previously contaminated area on 10/23/01	USEPA and START	Presented data to Dr. Malieki, West Palm Beach Health Department for acceptance
Lake Worth PO	0.5% bleach solution*; decontaminated sorting machines, hot boxes, and peripheral areas	USEPA, ATSDR, CDC/NIOSH, USCG	Wet swab. One (1) sample (plus one control) was collected from the previously contaminated area on 10/18/01	USEPA and START	Presented data to Dr. Malieki, West Palm Beach Health Department, for acceptance
Lucerne PO	0.5% bleach solution*; decontaminated sorting machines, hot boxes, and peripheral areas	USEPA, ATSDR, CDC/NIOSH, USCG	Wet swab; 10 samples collected from the previously contaminated and suspect areas on 11/01/01	USEPA and START	Presented data to Dr. Malieki, West Palm Beach Health Department for acceptance

Table C-3. Decontamination/Verification Data on Positive Facilities (cont.)

Facility	Type of decontamination procedure and what was decontaminated	Agency/group performing decontamination	Type/number of verification samples	Agency/group performing verification sampling	Clearance date/procedure and agencies involved
Trenton P&DC	0.525% sodium hypochlorite (bleach) solution; chlorine dioxide (ClO <sub>2</sub> ) gaseous sterilization	Postal Service/Shaw	Ongoing	Postal Service/Shaw	New Jersey Environmental Clearance Committee (ECC) (Ongoing)
Jackson Main PO	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR 5 wipes	Postal Service/Shaw	11/10/01 Standard Operating Procedure #1 "General Building Cleaning for Anthrax Contamination" Postal Service/Shaw
Princeton PO	2.1% sodium hypochlorite (bleach) solution HEPA vacuuming of all Route 38 mail, bins, desktops, drawers, light fixtures, floors and personal items.	Postal Service/IT	Wet Swab—26 samples collected from areas close to where one positive sample had been collected	CDC-NJDHSS	11/05/01  Eddy A. Bresnitz, MD, MS State Epidemiologist/Assistant Commissioner NJDHSS
Princeton—Palmer Square Station	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR 5 wipes	Postal Service/Shaw	11/10/01 Standard operating procedure #1 "General Building Cleaning for Anthrax Contamination" Postal Service/Shaw
Rocky Hill PO, New Jersey	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR 5 Wipes	Postal Service/Shaw	11/10/01 Standard operating procedure #1 "General Building Cleaning for Anthrax Contamination" Postal Service/Shaw

Table C-3. Decontamination/Verification Data on Positive Facilities (cont.)

Facility	Type of decontamination procedure and what was decontaminated	Agency/group performing decontamination	Type/number of verification samples	Agency/group performing verification sampling	Clearance date/procedure and agencies involved
Southern NJ P&DC	CRT screen removed and decontaminated	Not Available	Not Available	Not Available	Unknown. Subsequent court-ordered testing (HEPA socks) over 2 years found no positive results.
Trenton Station E PO	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR 5 wipes	Postal Service/Shaw	11/11/01 Standard operating procedure #1 "General Building Cleaning for Anthrax Contamination" Postal Service/Shaw
Brentwood P&DC	0.525% sodium hypochlorite (bleach) solution; chlorine dioxide gaseous sterilization (ClO <sub>2</sub> )	Postal Service. NIOSH, OSHA, Shaw E & I, Inc.	PCR—9,836 Culture—5,585	Postal Service/Shaw—ECC	2/26/03 DCN-D-032: <i>Procedure for Initial Response for Facility Decontamination; Operational Procedure B-043</i> Postal Service/Shaw-ECC
Dulles PO	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR/5 wipes	Postal Service/Shaw	10/30/01 DCN-D-032: <i>Procedure for Initial Response for Facility Decontamination; Operational Procedure B-043</i> Postal Service/Shaw
Friendship Station PO	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR/7 wipes	Postal Service/Shaw	10/29/01 DCN-D-032: <i>Procedure for Initial Response for Facility Decontamination; Operational Procedure B-043</i> Postal Service/Shaw

Table C-3. Decontamination/Verification Data on Positive Facilities (cont.)

Facility	Type of decontamination procedure and what was decontaminated	Agency/group performing decontamination	Type/number of verification samples	Agency/group performing verification sampling	Clearance date/procedure and agencies involved
Pentagon Station PO	0.525% sodium hypochlorite (bleach) solution	Postal Service—Shaw	PCR/10 wipes	Postal Service/Shaw	11/04/01 DCN-D-032: <i>Procedure for Initial Response for Facility Decontamination; Operational Procedure B-043</i> Postal Service/Shaw
Raleigh P&DC	Application with sprayers and wet wiping of a 0.5% sodium hypochlorite (bleach) solution to all items and surfaces within the Accountable Papers room	Postal Service Contractor—IT Corporation	Dry Swabs. 41 dry swab samples taken within the Accountable Papers Room	IT Corporation	November 2001—UICC and state health department.
Southwest Station	0.525% sodium hypochlorite (bleach) solution	Postal Service/Shaw	PCR/6 wipes	Postal Service/Shaw	10/30/01 DCN-D-032: <i>Procedure for Initial Response for Facility Decontamination; Operational Procedure B-043</i> Postal Service/Shaw
Morgan Station P&DC	Thorough cleaning and disinfection of 3rd floor South (all machines and surfaces, floor to ceiling, including bridge area over 29th street; cleaning and disinfection of 34 sorting machines and immediate surroundings on 2nd floor south.	Postal Service Contractors - Clean Harbors, Louis Berger Group, and IT Corporation	30 Wet swabs and 20 HEPA sock samples	Louis Berger Group, URS Corporation	December 2001. UICC in concert with USEPA and New York City and State Health Agencies.

Table C-3. Decontamination/Verification Data on Positive Facilities (cont.)

Facility	Type of decontamination procedure and what was decontaminated	Agency/group performing decontamination	Type/number of verification samples	Agency/group performing verification sampling	Clearance date/procedure and agencies involved
Indianapolis Parts & Maintenance (6 others)	0.525% sodium hypochlorite (bleach) solution used to clean a rack of computer equipment sent from Trenton P&DC	Postal Service Contractor - IT Corporation with EPA oversight	300 Air and Wet wipe samples	EPA	Indiana Health Department analyzed and reviewed data and re-opened the building.
Kansas City Stamp Fulfillment Services	Information was not available				
Southern CT P&DC	General MPE 0.5% sodium hypochlorite (bleach) solution with surfactant applied to DBCS units 4, 6, 10, and 11; High bay areas (3 positive areas)	Postal Service Contractor—IT Corporation	General MPE. Dry Swab. 115 samples from DBCSs. Aggressive air samples from DBCS # 10. High bay areas Wet wipes; 45 samples collected from surfaces. Aggressive air samples Andersen air samples—33 DFU air samples—15	IT Corporation          URS	UICC in conjunction with State and Federal Public Health Agencies. General MPE—12/20/01.  High bay areas June 2002

# Appendix D

## Anthrax Verification Survey

### Template/Instructions

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U.S. Postal Service  
Engineering/Administrative Controls for Anthrax Verification Survey

Facility Name:            Area:            PC:

Each item must be checked YES, NO, or N/A if appropriate. If N/A is shaded, only Yes or No are answer options.

Engineering Control	YES	NO	N/A
1. Was bleach used to clean floors from 11/1/01 to 6/02?			
2. Was bleach used to clean working surfaces from 11/1/01 to 6/02			
3. Was bleach used to clean MPE from 11/1/01 to 6/02			
4. Has bleach been used routinely since 6/02?			
5. Has custodial cleaning by wet methods been used continuously since 11/1/01?			
6. Has the ban on dry sweeping been enforced continuously since 11/1/01?			
7. Are HEPA vacuums used to clean MPE?			
8. Are HEPA vacuums used to clean HVAC components?			
9. Are HEPA vacuums used to clean vehicle interiors?			
10. Are HEPA vacuums used to clean high bay areas?			
11. Is the use of compressed air for cleaning banned?			
12. Are Filtering Face-Piece (FFPs) masks available and provided on request?			
13. Are nitrile gloves available and provided on request?			
14. Has the "Suspicious powder" tabletop exercise or checklist been completed?			
15. Are Emergency Action Plans up to date including employee information and training?			
16. Have Anthrax safety talks been given to employees as directed since 10/01?			

Any "NO" answers (except for item 4. which is not required by policy) should be explained below by item number. If the facility has taken other protective/reactive steps not listed above they can be explained below.

Installation Head \_\_\_\_\_ Phone# \_\_\_\_\_ Date \_\_\_\_\_

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Instructions:

This survey is required to assist the Postal Service, employee representatives, and health, safety, and environmental agencies to respond to Government Accounting Office recommendations concerning the anthrax attacks of 2001. The survey is intended to determine the effectiveness of engineering controls and administrative measures put into place to protect employees from anthrax. Candid answers are expected for each item. An accurate survey is needed to revisit risk, which most experts agree is minimal. However, if a “No” is checked for a required practice, please indicate why and how the responsible manager will ensure that proper procedures are followed in the future.

Only the 284 facilities sampled for anthrax subsequent to the 2001 attacks are included in the scope of this survey. DO NOT include information for attached or related facilities that were not tested.

Included in this package is a copy of MMO-047-03, which summarizes current policy on cleaning. The MTSC web site can also be consulted for various policy documents issued since 2001.

This survey is to be completed and returned to Safety Performance Management BY E-MAIL ONLY. The installation head is responsible for ensuring the survey is accurate and returned in a timely manner.

E-Mail surveys to BOTH addresses below:

flundbla@email.usps.gov

jblalock@email.usps.gov

Questions about survey requirements can be directed to Frank Lundblad, 202-268-3692, or by E-mail.

# Appendix E

## Supplemental Data from the Verification Survey

This appendix presents data to add context to the information regarding the implementation of Postal policies and the distribution of facilities surveyed.

The decision was made to review and summarize the reasons given for answering any question with a “No” response with the exception of survey question 4. A “No” response for question 4 was deemed acceptable since it is not based on a requirement of postal policy. Questions 7 and 16 did not have any “No” responses, however, all other questions had at least one “No” response. Table E-1 summarizes of all comments. On several questionnaires, the same general comment was stated in more than one way by different facilities. In this table, similar comments were consolidated and given a single voice.

*Table E-1. Summary of Comments for “No” on Survey Responses*

Question	Comment(s)
1	We have no MPE and therefore no need to use bleach
	The smell of bleach is offensive to employees on workroom floors
	We do not process mail
	We are a small leased facility with limited supplies and access to cleaning supplies/facilities
	We used H2O Orange to kill Anthrax
	We used HEPA vacuums on the floors
	This is a warehouse with no custodial staff
	Bleach is not part of the facility inventory
	There was union pressure not to use bleach around employees
	We are in a leased facility and have no control over contracted custodial staff
	We have wall to wall carpet
2	We have no MPE and therefore no need to use bleach
	We do not process mail
	We only use bleach on bathrooms, hallways and break area floors
	We do not use bleach to clean desks, tabletops or computer stations.
	The smell of bleach is offensive to employees
	We only use bleach if a suspicious powder was found
	We only use bleach if there is a spill incident
	We used H2O Orange to kill Anthrax
	We used HEPA vacuums for surfaces

Table E-1. Summary of Comments for “No” on Survey Responses cont.

Question	Comment(s)
	This is a warehouse with no custodial staff
	Bleach is not part of the facility inventory
	There was union pressure not to use bleach around employees
	We are in a leased facility and have no control over contracted custodial staff
	We are not aware of this requirement
3	We have no need to use bleach
	The smell of bleach is offensive to employees
	We are not aware of this requirement—no MMO or directive was issued
	We only use bleach if a suspicious powder was found
	We only use bleach if there is a spill incident
	We were Instructed not to do a one-time bleach cleaning because of upcoming facility testing
	We use HEPA vacuums to clean MPE
	We don't use bleach because it causes corrosion of MPE
	We use no liquids except alcohol to clean MPE
	There was union pressure not to use bleach
	We use anti-bacterial product Simple Green
4	<b>Routine use of bleach was not required—“NO” response is acceptable</b>
5	We use HEPA vacuums instead of wet methods
	We do not process mail
	We didn't use wet methods until MMO in August 03 (implies—not aware of a requirement)
	We are a small leased facility with limited supplies and access to cleaning supplies/facilities
	This is a warehouse with no custodial staff
6	We were not aware of any policy/requirement
	We do not process mail
	We are a small leased facility with limited supplies and access to cleaning supplies/facilities
	We stopped dry sweeping with issuance of MMO in August 03
	This is a warehouse with no custodial staff
	We are in a leased facility and have no control over contracted custodial staff
7	<b>There were not any “NO” responses to this question</b>
8	We don't have HEPA vacuums
	We didn't buy HEPA vacuums—we were told they would be sent
	We clean our units with soap & water and do filter changes every 6 months

Table E-1. Summary of Comments for “No” on Survey Responses cont.

Question	Comment(s)
	We only have outside units—we have no need to clean them just change filters
	We do not process mail
9	We were not aware of any policy/requirement
	We don't have HEPA vacuums
	We didn't buy HEPA vacuums—we were told they would be sent
	We use pressure washers on the inside of the vehicles
	There was no directive issued
	We use brooms to sweep out inside of vehicles
	We vacuum truck cabs at the carwash but we don't clean inside trucks
	We use ammonia and water to clean inside truck cabs
10	Use HEPA vacuum only on MPE
	Don't have HEPA vacuums
	We do not process mail
11	We use compressed air in a Dust Containment Unit for cleaning computers
	We do not process mail
12	We are an administrative office in leased space—no one offered us masks
13	We are an administrative office in leased space—no one offered us gloves
14	We were not aware of any policy/requirement
	We never heard of this exercise
	We have planned to complete this later this year
	This is a warehouse with no permanent staff
15	Currently replacing major equipment—CAD drawings being updated and emergency action plans (EAP) will be updated with the new information
	Updates of EAP is currently in process—most training is completed
	We are an administrative office in leased space—biohazards are not in our response plans
	This is a warehouse with no permanent staff
16	<b>There were not any “NO” responses to this question</b>

Tables E-2 through E-4 list the all of the facilities responding to the survey by the category of the facility. Facilities are sorted by postal area with the total number of applicable facilities listed. In assigning the facilities to one of the tables, the following definitions were applied—plants of all types (such as a P&DC, P&DF, BMC, AMC) were considered to be ‘large’ facilities and all other facilities (such as a PO, Branch, Station, etc.) are considered ‘small’ facilities.

*Table E-2. Listing of Large Facility Respondents with Automated MPE*

Postal Area—Total Facility Count	Facility
Capital Metro—16	Anacostia
	Baltimore IMF
	Baltimore P&DC
	BWI AMF
	Calvert DDC
	Curseen-Morris (Brentwood)
	Dulles AMC
	Dulles P&DC
	Frederick P&DF
	Joel T. Broyhill (Merrifield) P&DC
	Norfolk P&DC
	Richmond P&DC
	Ronald Reagan National AMC
	Southern MD P&DC
	Suburban P&DC
	Waldorf DDC
Eastern—19	Charlotte P&DC
	Cincinnati
	Citygate/Columbus P&DC
	Cleveland P&DC
	Dayton P&DC
	Harrisburg P&DC
	Lancaster P&DC
	Lehigh Valley P&DC
	Louisville P&DC
	Philadelphia AMC
	Philadelphia BMC
	Philadelphia L&DC
	Philadelphia, P&DC
	Pittsburgh P&DC
	Raleigh P&DC
	Reading P&DC
	South Jersey P&DC
	Southeastern P&DC
	Wilmington P&DC
Great Lakes—14	Cardiss Collins/Chicago Central
	Carol Stream P&DC

Table E-2. Listing of Large Facility Respondents with Automated MPE cont.

Postal Area—Total Facility Count	Facility
	Detroit P&DC
	Fox Valley P&DC
	Grand Rapids P&DC
	Indianapolis P&DC
	Indianapolis Repair Facility (IRF)
	Irving Park Road P&DC
	J.T. Weeker ISC
	Milwaukee P&DC
	Palatine P&DC
	Royal Oak P&DC
	South Suburban P&DC
	St. Louis P&DC
Northeast—10	Albany P&DC
	Boston GMF
	Buffalo P&DC
	Hartford P&DC
	New Haven P&DC
	Northwest Boston P&DC
	Providence P&DC
	Rochester P&DC
	Southern Connecticut P&DC
	Stamford P&DF
New York Metro—17	Bronx P&DC
	Brooklyn P&DC
	DVD P&DC
	Hackensack P&DC
	JAF P&DC
	JFK ISC
	Kilmer P&DC
	Mid Island P&DC
	Monmouth P&DC
	Morgan P&DC
	NJ and BMC
	Paterson
	Queens P&DC
	West Jersey P&DC
Westchester P&DC	

*Table E-2. Listing of Large Facility Respondents with Automated MPE cont.*

Postal Area—Total Facility Count	Facility
	Western Nassau P&DC
	Newark P&DC
Pacific—19	Anaheim
	Honolulu P&DC
	Industry P&DC
	Las Vegas P&DC
	Long Beach
	Los Angeles ISC
	Los Angeles P&DC
	Marina P&DC
	ML Sellers P&DC
	Oakland P&DC
	Phoenix P&DC
	Sacramento P&DC
	San Bernardino P&DC
	San Francisco ISC
	San Francisco Mail Recovery Center
	San Francisco P&DC
	San Jose P&DC
Santa Ana P&DC	
Santa Clarita P&DC	
Southeast—18	Atlanta BMC
	Atlanta P&DC
	Birmingham PDC
	Fort Myers P&DC
	Jacksonville BMC
	Jacksonville P&DC
	Memphis BMC
	Memphis P&DC
	Miami ISC
	Miami P&DC
	Mid-Florida P&DC
	Nashville P&DC
	North Metro P&DC
	Orlando P&DC
	South Florida P&DC
St. Petersburg P&DC	

Table E-2. Listing of Large Facility Respondents with Automated MPE cont.

Postal Area—Total Facility Count	Facility
	Tampa P&DC
	West Palm Beach P&DC
Southwest—11	Austin P&DC
	Dallas ISC
	Dallas P&DC
	Forth Worth P&DC
	Houston P&DC
	Little Rock P&DC
	New Orleans P&DC
	North Houston P&DC
	North Texas P&DC
	San Antonio P&DC
	Tulsa P&DC
Western—12	Billings P&DC
	Denver P&DC
	Des Moines P&DC
	Kansas City P&DC
	MPLS P&D
	Omaha P&DC
	Portland P&DC
	Salt Lake City P&DC
	Seattle P&DC
	St. Paul Mail Recovery Center
	St. Paul P&DC
	Topeka Material Distribution Center/Equipment Repair Facility

*Table E -3. Listing of Small Facility Respondents with Automated MPE*

Postal Area—Total Facility Count	Facility
Capital Metro—5	CFS Unit
	Dulles PO
	Gaithersburg Annex
	Landover Hills
	Randolph Dr. Facility
Great Lakes—1	Park Fletcher Branch
Northeast—1	Braintree, MA DMU
New York Metro—13	Ansonia Station
	Cassville Station
	Eastside Parcel Post Facility
	FDR Station
	Hightstown
	Jackson PO
	Lambertville
	New Brunswick CFS
	Princeton MPO
	Radio City Station
	Rockefeller Station
Southeast—3	Stockton PO
	Times Square Station
	Atlanta Mail Recovery
	Blue Lake
	Greenacres Branch
Western—2	Fort Collins
	Helena, MT PO

Table E-4. Listing of Facility Respondents With No Automated MPE

Postal Area—Total Facility Count	Facility
Capital Metro—48	20th Street
	Ben Franklin
	Benning Road
	Bolling AFB
	Brightwood
	Brookland
	Calvert Station
	Chillum Place Annex
	Cleveland Park
	Columbia Heights Finance
	Columbia Heights Station
	Congress Heights
	Customs House
	Dulles Fin Station
	Farragut
	Fort Davis
	Fredrick Douglas
	Friendship
	Georgetown
	HASP
	Kalorama
	L'Enfant Plaza
	Lamond Riggs
	Landover, MD HQ Staging Warehouse (IS)
	Ledroit Park
	Main Office Carrier Station
	Martin L. King Fin Station
	McPherson
	Mid City
National Capital	
Northeast	
Northwest	
Palisades	
Pentagon	
Randle Station	
River Terrace	
Rockville, MD MPO	
Southeast	

Table E-4. Listing of Facility Respondents With No Automated MPE cont.

Postal Area—Total Facility Count	Facility
	Southwest
	T Street
	Tech World
	Temple Heights
	V Street
	Walter Reed Station
	Ward Place
	Washington Square
	Watergate
	Woodridge Fin Station
Eastern—1	Philadelphia MTESC
Postal Service Headquarters—10	Admin. Office
	Dulles Stamp Distribution Network
	Facilities Headquarters
	Forensic & Technical Services Div.
	Inspector General's Office—Arlington VA
	Judicial Offices
	Marketing
	Sales
	W. F. Bolger (Firing Range)
	W. F. Bolger (Mailroom)
Northeast—1	Seymour PO
New York Metro—48	Allentown PO
	Belle Mead PO
	Blawenburg PO
	Bordentown
	Boulevard Station
	Chambersburg Station
	Chelsea
	Circle Branch Station
	Clarksburg
	Cookstown
	Cranbury PO
	Cream Ridge
	Crosswicks
	Downtown Station
	Florence
	Fort Dix

Table E-4. Listing of Facility Respondents With No Automated MPE cont.

Postal Area—Total Facility Count	Facility
	Gracie Station
	Hillsborough PO
	Hopewell PO
	Imlaystown
	Kingston PO
	Lawrenceville
	McGuire Air Force Base
	Mercerville
	Monroe PO
	New Egypt
	Northern New Jersey HASP (Carteret)
	Pennington
	Perrineville PO
	Plainsboro PO
	Princeton Junction PO
	Princeton Palmer Square Station
	Ringoos PO
	Rocky Hill PO
	Roebing PO
	Roosevelt PO
	Rosemont PO
	Sergeantsville
	Skillman PO
	Station C
	Titusville PO
	Trenton Downtown Station
	Trenton PM
	Trenton Station E
	West Trenton Facility
	Windsor
Wrightstown	
Yardville	
Southeast—4	Boca Raton MPO
	Lake Worth MPO
	Lantana
	Lucerne Station
Western—1	Kansas City Stamp Fulfillment Services

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# Appendix F

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# Appendix G

## Abbreviations

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AMC	Air Mail Center
AMF	Air Mail Facility
APHL	Association of Public Health Laboratories
APWU	American Postal Workers Union
ATSDR	Agency for Toxic Substances and Disease Registry
BMC	Bulk Mail Facility
CDC	Center for Disease Control and Prevention
CSF	Central Sorting Facility
DHS	Department of Homeland Security
EAP	Emergency Action Plan
EPA	Environmental Protection Agency
FBI	Federal Bureau of Investigation
GAO	General Accounting Office
GMF	General Mail Facility
HEPA	High Efficiency Particulate Air (filter, sock or vacuum)
MPE	Mail Processing Equipment
MPO	Main Post Office
NALC	National Association of Letter Carriers
NPMHU	National Postal Mail Handlers Union
NRLCA	National Rural Letter Carriers Association
OSHA	Occupational Safety and Health Administration
P&DC	Processing and Distribution Center
P&DF	Processing and Distribution Facility
PCR	Polymerase Chain Reaction
PO	Post Office
USACOE	United States Army Corps of Engineers
USPS	United States Postal Service

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