Environmental Testing for Anthrax – Problems?

Sushil K. Sharma, PhD., DrPh, Jack Melling, PhD, Keith Rhodes, Bernie Ungar, Hazel Bailey, Hazel Balent, U.S G.A.O .

In fall of 2001, letters laced with *Bacillus anthracis* (anthrax) spores were sent through the mail to two U.S. Senators and to members of the media. These letters led to the first U.S. cases of anthrax disease related to bioterrorism. In all, 22 individuals, in four states and Washington, D.C., contracted anthrax disease; 5 died. GAO was asked to (1) assess federal agencies' activities to detect anthrax in postal facilities, (2) assess the results of agencies' testing, and (3) assess whether agencies' detection activities were validated.
U.S.P.S., CDC, and EPA conducted several interdependent activities to detect anthrax in postal facilities. They developed a sampling strategy, and (2) collected, (3) transported, (4) extracted, and analyzed samples. They primarily collected samples from specific areas, such as mail processing areas—targeted sampling—and used their judgments about where anthrax would most likely be found. They did not use probability sampling; therefore, inferences about a facility's contamination could not be reliably made. Since no activities were validated for anthrax testing in indoor environments, the agencies had no basis for choosing one method of sampling or analysis over another.
The results of the agencies' testing in 286 postal facilities were largely negative—i.e., no anthrax was detected. But negative results do not necessarily mean that a facility was free from anthrax. For example, results could be negative if samples were not collected from places where anthrax was present, if the collection method was not efficient, or if other problems were related to the detection process.
Validation is an empirical process in which an authority determines and certifies the performance of a given method. Without validation of the methods associated with each of the agencies' activities, their sampling strategies may have been based on false assumptions. More importantly, the lack of validation of their activities, coupled with limitations associated with their targeted sampling strategy, means that there could be little confidence in the reliability of the negative test results.

Soil and Air Environmental Sample Collection
Friday, January 28

High Flow Biological Aerosol Sampling and Automated Sample Preparation Using Cartridges of Packed Glass Beads

Jon Davis, Chris Earle, Roger Reynolds, Pok Cha Samarrai and Kathy Terlesky. General Dynamics-Advanced Information Systems, 1115 5th St. S.W., Charlottesville, VA 22902

We have developed a high efficiency aerosol sampling technology that can be tailored to operational or performance parameters including high or low flow systems, and power or size constrained applications. For a program sponsored by TSWG, this technology was adapted to perform in a high flow regime (>500L/min) with PSL collection efficiency greater than 80%. The completed air sampler unit incorporates cartridges filled with glass beads, has a total weight of less than 25 lbs, and operates at a total flow rate of 670 L/min. The cartridges can then be transferred to a separate unit (Sample Prep Box) that removes, cleans and lyses collected material from the cartridge providing two output samples, lysed and unlysed, for subsequent analysis. The Sample Prep Box incorporates a flow-through PVPP disposable cartridge that removes dirt from the sample while retaining spores in the liquid output. Sample processing time is 15 minutes. Both boxes are portable, and rugged.

NIOSH Evaluation of Air Sampling Methodologies for *Bacillus anthracis* in a United States Postal Service Processing and Distribution Center

Robert E. McCleery, Kenneth Martinez, Gregory Burr, and Dino Mattorano
National Institute for Occupational Safety and Health (NIOSH)

During the week of February 4-7, 2002, NIOSH conducted a health hazard evaluation at the Trenton Processing and Distribution Center in response to a request from the United States Postal Service for collaborative research to evaluate air sampling methods for *Bacillus anthracis* spores before and after operation of a delivery bar code sorter (DBCS). Investigators collected 106 wipe samples using sterile polyester/rayon pads moistened with sterile water and 256 air samples using mixed cellulose-ester filters (MCE), polytetrafluoroethylene filters (PTFE), gelatin-coated filters (GEL), dry filter units with polyester felt filters (DFU), and Andersen single-stage cascade impactors containing trypticase soy agar plates with 5% sheep blood. All wipe samples were positive for *B. anthracis* indicating that the DBCS remained heavily contaminated. Initial air sample analyses (10% of the sample extract) indicated that before operating the DBCS, all MCE, PTFE, GEL, and DFU filters were negative for *B. anthracis*; however, 19% of Andersen samples were positive. After operating the DBCS, all sample media indicated some positive samples, which included 91% of the Andersen samples. The re-analysis (remaining 90% of sample extract) of previously negative filter samples collected before and after DBCS operation resulted in additional positive samples. This clearly demonstrates that all evaluated methods were capable of collecting *B. anthracis* spores to some degree, and that re-aerosolization

McCleery R, Martinez K, Burr G, Mattorano D [2005]. NIOSH evaluation of air sampling methodologies for bacillus anthracis in a united states postal service processing and distribution center. Abstracts of the 1st National Conference on Environmental Sampling for Bio-Threat Agents, Baltimore, Maryland, January 27-28, 2005. Washington D.C.: Department of Homeland Security/Department of Defense, CD publication.
NN:
Administrative Code: HCC52
CAN No.: 5927008L