
Anthrax Decontamination

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In October 2001, Washington, D.C., fell victim to the largest bioterrorist attack in the history of the United States, which resulted in its largest biohazard decontamination ever. The anthrax contamination caused closure of several facilities, one of which was the Hart Senate Building.¹ In response to the attacks, officials from the Centers for Disease Control and Prevention (CDC), the Environmental Protection Agency (EPA), and the U.S. Senate (the planning committee) began decontamination planning. Essential to the decontamination plan was the use of civilian decontaminants and the four doctrinal decontamination principles:

- Decontaminate as soon possible.
- Decontaminate only what is necessary.
- Decontaminate as far forward as possible.
- Decontaminate by priority.

The CDC, EPA, and Senate's plan required efficient decontaminants. They consulted private agencies for decontaminant products trying to find the most efficient anthrax decontaminant. Once the agencies possessing the best decontaminants were selected, the planning committee created the plan to decontaminate the buildings. In February 2002, four months after implementation, the plan to decontaminate the largest biohazard contamination ended successfully.

Can the biological decontaminants used in the Hart Senate Building work for the Chemical Corps? The answer is yes! This article establishes reasons why.

Various biological decontaminants are listed in FM 3-5, *NBC Decontamination*. Biological decontamination is possible using standard decontaminants such as decontamination solution number 2 (DS2) or nonstandard decontaminants like ethylene oxide.² The standard decontamination platoon only carries DS2 and supertropical bleach. It is feasible to argue that during wartime, decontamination platoons will find nonstandard decontaminants difficult to procure.

To solve this problem, the Army should incorporate the civilian decontaminant, Sandia foam—used in the decontamination of the Hart Senate Building—into its standard decontaminants listed in FM 3-5. The expansion of this list will increase the Chemical Corps's inventory of standard decontaminants. The expansion will also increase flexibility in decontaminant choices for decontamination platoons, ultimately increasing overall readiness.

Use of such an efficient decontaminant in the Chemical Corps is necessary in the event the Army faces anthrax contamination. Anthrax can cause black cutaneous eschars or dry scabbing crusts.³ When used as an aerosol, anthrax causes inhalation fatalities; patients present signs and symptoms resembling the flu, but some die one to three days later. A sterile protein-based anthrax vaccine with an effectiveness of 88 percent at 100 weeks (as required for military personnel) has been produced.⁴ Unfortunately, supplies are limited and are not available for civilian

use.⁵ Consequently, unvaccinated civilians lost their lives after inhaling anthrax on Capitol Hill during 17 to 22 October 2001.⁶

On 29 October 2001, following the deaths, Senate leaders agreed to begin decontamination of the Hart Senate Building. They inadvertently applied the first decontamination principle with their resolution—decontaminate as soon as possible.⁷

Standing nine stories tall and encompassing 10 million cubic feet, the Hart Senate Building required decontamination in specific anthrax-contaminated areas. Senate Majority Leader Tom Daschle, a recipient of an anthrax-ridden letter, acted as the spokesperson for the anthrax decontamination plan. He announced that the first plan to pump chlorine dioxide gas throughout the building would cause “too many dangers inherent with using gas throughout the complex.” Chlorine dioxide gas was not chosen to decontaminate the entire building for the following reasons:

- It can seep into rugs, drapes, and anywhere anthrax may have landed.
- It can cause damage to expensive artwork and furniture.
- It is time-consuming.⁸

Instead, the planning committee suggested a combined use of an antibacterial foam (Sandia foam) in contaminated areas and chlorine dioxide gas in the heating, ventilating, and air-conditioning (HVAC) system.⁹ By decontaminating affected rooms

and the HVAC system, the committee inadvertently applied the second decontamination principle—decontaminate only what is necessary.

Senate leaders chose the Hart Senate Building, by priority and need, to decontaminate first (fourth decontamination principle—decontaminate by priority). They chose this building over other contaminated civilian facilities so government officials could resume work. It remained closed for the duration of the cleanup so all forms of anthrax life could be eliminated.

Applying the third decontamination principle—decontaminate as far forward as possible—CDC workers selected areas of high versus low contamination. Upon selection of the areas to be decontaminated, the workers ran a ground-level pipe into the HVAC system for chlorine dioxide gas output. Crews kept the HVAC system filled with as much as 2,000 pounds of chlorine dioxide for 12-hour periods. After a 12-hour period, crews tested the HVAC system with test strips similar to the smart tickets used in the Biological Integrated Defense System (BIDS).¹⁰ If contamination was found during the test, the decontamination process was repeated.

In February 2002, the decontamination process ended successfully. Although this decontamination procedure was practical for use in the Hart Senate Building, it would not be a practical decontaminant for the Army because the EPA has limited its sale, distribution, and use.¹¹ However, the use of Sandia foam in the decontamination of the Hart Senate Building was significant. It is a concoction of “ordinary household substances

such as those found in hair conditioner and toothpaste.”¹² It resembles shaving cream; can be applied as a liquid spray, mist, fog, or foam; and neutralizes a wide variety of chemical and biological agents in mere minutes. It is also similar to a fire retardant that can be sprayed from handheld canisters or trucks, which can be dispensed in an open area such as a runway.¹³ It can also be incorporated into the fire sprinkler systems of high-profile government or military buildings. Environmentally friendly, nontoxic, and noncorrosive, the foam has proven to be effective against “viable anthrax spores and chemical warfare agents (VX, mustard, and soman).”¹⁴



Demonstration of the application of the new chemical-biological decontamination foam from a pressurized canister.

Sandia foam, Decontamination Foam 200, can cost as little as \$0.15 per pound.¹⁵ This is an enticing price for an efficient decontaminant to add to the Army’s standard decontaminant inventory.

The efficient decontamination of the Hart Senate Building eased the fear of possible anthrax contamination for its users. However, the threat of similar attacks to high-visibility buildings and personnel remains possible. Anthrax mail attacks are not to be forgotten nor are they an event of the past only. Therefore, the military—particularly the Army—must stay abreast of developing biological decontaminants. Ethylene oxide and cold flame are two proposed decontaminants that were not used in the decontamination of the Hart Senate Building.

The CDC, the World Health Organization, and the American Public Association recognize ethylene oxide as a proven decontaminant. The Chemical Corps is also familiar with this nonstandard decontaminant from tests conducted at Fort Detrick, Maryland, more than 50 years ago. Ethylene oxide can be used to sterilize food, cosmetics, hospital surgical equipment, and plastic devices that cannot be sterilized by steam. Ethylene oxide can also be used to provide immediate decontamination via a mobile sterilization unit.¹⁶ Although not chosen for assistance in the decontamination of the Hart Senate Building, this decontaminant is a feasible method for anthrax decontamination. The downfall of this decontaminant is its limited use in an airtight enclosure and its flammable quality.

The second proposed decontaminant not used in the

Hart Senate Building was cold flame. It is a dry decontamination device designed by a team at Los Alamos National Laboratory. This device ionizes a mix of helium and oxygen, emitting a cloud of charged particles.¹⁷ The result is plasma, which looks similar to fire but is 70 degrees Celsius colder. Its content—a highly reactive form of oxygen—neutralizes pathogens such as anthrax. Cold flame was not used because the leader of the team wanted to “clean things up without destroying them.”¹⁸

Devices neutralizing pathogens through ionization could cost the Army millions of dollars due to their intricate makeup. Although cost is one factor, another negative factor is their lack of production. These devices are not out of the developmental phase and have not been manufactured. Therefore, cold flame is not yet a worthy decontaminant for the Army.

In preparation for future bioterrorist attacks against the United States, the Chemical Corps could use Sandia foam, chlorine dioxide, and ethylene dioxide to expand its biological decontamination options. Of these decontaminants, the low-cost Sandia foam is the best alternative for the Army. Learning from the success of the civilian sector, there is no question as to whether the Army should incorporate it into the Chemical Corps’s standard decontaminants. The foam will prove effective and change the world of decontamination as the Chemical Corps knows it today. Decontamination with ethylene oxide is feasible; however, because of its

limited use in an airtight enclosure, it is best left as a non-standard decontaminant. The use of chlorine dioxide as a decontaminant is costly and consumes significant manpower. This particular method is only feasible for use in the civilian sector. Finally, cold flame has not proven to be an effective decontaminant method because it is still in development. To expand its biological decontamination readiness further, the Army could use cold flame once it has been tested.

The civilian sector is not alone in bioterrorism decontamination. The Army is also affected when government officials are targets. If Army officials and civilian agencies collaborate on current biological decontamination techniques and methods, biological readiness will improve for both.

Endnotes:

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⁵“Anthrax,” *Johns Hopkins University Center for Biodefense Strategies*, 2, retrieved May 1, 2002, from EBSCO Information Services, p. 1-2.

⁶Washington and Virginia excerpt, *CNN*, retrieved May 1, 2002, from EBSCO Information Services, p. 1.

⁷Foerstel, p. 2669.

⁸J. Kluger, “Scrubbing Out the Spores,” *Time*, 22,62-65, retrieved May 1, 2002, from EBSCO Information Services, p. 22.

⁹Foerstel, p. 2668.

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¹⁴Gernsback, p. 11.

¹⁵German, p. 1-6.

¹⁶NewsRx.com, “Vacudyne, Sterilization Services Offer Proven Method to Kill Anthrax,” *TB & Outbreaks Week*, 11, 10, retrieved May 1, 2002, from EBSCO Information Services, p. 1.

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¹⁸*Ibid*, pp. 17-18.

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