

BIOTERRORISM IN THE HOMELAND: THE IMPACT OF ACTS OF  
BIOTERRORISM ON AMERICAN CULTURE

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## ABSTRACT

September 11, 2001, marked a profound change in the manner in which Americans viewed their homeland. The events of that day fostered the realization that America was not immune from destructive acts against its citizens, on its soil, from forces that serve to cripple and destroy the nation. Few individuals would argue that the terrorists' attacks of that day impacted the cultural landscape. In fact, few individuals would dispute that the circumstances of that day were tumultuous, and that even greater atrocities and calamities could have been experienced. What is the pulse of American society today as it relates to the threat of acts of bioterrorism?

Chapter one introduces why bioterrorist activity is a problem for America. It offers a review of the methodologies to be utilized to validate the principal hypothesis, which is, the philosophy of bioterrorism response and disaster management adopted by America, which seeks to constantly monitor and strives to prevent terrorist attacks, while implementing methods of response to attacks that happen, is one that must constantly be revised and revamped in order to be efficacious and effective in fighting the threat of bioterrorism in the homeland.

Chapters two and three explore the origins of bioterrorism and the different types of agents. Chapter two offers a brief history of bioterrorism, examines whether bioterrorism vigilance is justifiable or untenable, and offers a review of the various scholarly opinions regarding whether attacks by biological or chemical agents are likely or unlikely. Chapter three provides the definition of bioterrorism and offers a detailed examination of the various types of biological and chemical agents available for possible dissemination, and the techniques associated with each. In addition, an examination of relevant pieces of legislation which address the accessibility of, and the possession of these agents is offered.

Chapter four examines the potential economic and public health impact that acts of bioterrorism would have on the homeland, while chapter five investigates America's level of preparedness for biological attacks by examining simulated readiness planning exercises, and exploring options to improve biosecurity measures.

Chapter six studies the manner by which the threat of bioterrorism shapes American culture. An analysis of a simple random sample survey reveals the popular opinions of individuals in relation to how threats of bioterrorist type activities affect their existence. The conclusion reemphasizes the importance of accurately assessing the threat of bioterrorism in order to ensure the effectiveness of countermeasures and policy considerations, and substantiates the thesis' hypothesis.

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## **CHAPTER ONE**

### **IS THERE A BIOTERRORIST THREAT?**

#### **Introduction**

If America were to experience a terrorist attack, similar to the magnitude of September 11, 2001, by biological or chemical agents, how much more devastation would be evident? While attacks of biological agents are not a new phenomena, Americans have had limited exposure to the magnitude of devastation that bioterrorism in the homeland could cause. Have Americans conceptualized the ramifications that acts of bioterrorism would have on American culture; and if they have considered the potential effects, would the nation likely recover from the economic and public health impacts? Two possible consequences follow from this question: (1) If Americans were to conceptualize the possibility of biological warfare on American soil, its impact on culture would be heightened by the fact that biological and chemical agents may affect and infect arbitrarily, and attacks of these kinds are often undetectable until havoc occurs; and (2) myriad resources are available to extremists and terrorist organizations desirous of launching attacks of bioterrorism on American soil.

#### **The Problem**

The philosophy of emergency terrorism response and bioterrorism countermeasure management which America fights to maintain must be constantly amended and overhauled in order to remain plausible and effective in fighting the threat of bioterrorism in the homeland. Conflicting opinions as to whether biological attacks are even probable contribute to laissez-faire attitudes toward terrorism policy, which in turn

hamper long term, effective policy development. Just as safety and design engineers assess the reliability and safety of cars by performing roll over tests, crash tests, and seat belt effectiveness to determine potential risk factors—and make changes to ensure consumer preservation—America’s crisis response measures should be executed often, and reengineered often, to ensure their effectiveness. Analyzing the results of ongoing readiness planning exercises will emphasize weaknesses in the systems, and will highlight the vulnerability of areas that may be detrimental to consumer preservation. Determining where disconnects exist between those who want to protect the homeland and those who want to harm the homeland are essential parts of defense strategy. While this important component should not be overlooked, as far as preparedness planning, exploration of this factor—outside of mentioning that there are many faces of bioterrorism, whether looking at terrorists in the sense of groups or as independently acting individuals—is beyond the scope of this thesis project.

### **Hypothesis/Methodology**

Careful analyses of scholarly opinion, as well as an in-depth review of specific congressional sessions relating to proposals for the consideration of legislation to discourage and possibly prevent bioterrorist attacks, will shape the position taken by this thesis; the philosophy of bioterrorism response and disaster management adopted by America, which seeks to constantly monitor and strives to prevent terrorist attacks, while implementing methods of response to attacks that happen, is one that must constantly be revised and revamped in order to be efficacious and effective in fighting the threat of bioterrorism in the homeland.

When determining the efficacy of terrorism policy, it is important to consider all of the variables that are likely to affect the desired outcome, all the while implementing new methodologies to ensure the desired outcome. In addition, a review of *Executive Orders 13527 and 13546* are imperative to this project, as they address the timely provision of medical countermeasures in the event of biological attacks, and stress that biological agents must be carefully and skillfully maintained to prevent abuse and potential misuse. Finally, the results of a community survey will assess the level at which individuals believe they are risk, as it relates to the threat of bioterrorism on American soil, and analyze public opinion as to the extent this risk impacts American culture.

## CHAPTER TWO

### BIOTERRORISM VIGILANCE- JUSTIFIABLE/UNTENABLE?

Using biological or chemical agents is not an innovative practice or phenomenon. In fact, usage of these weapon types dates back to approximately 400 BC when the Scythian archers tainted their arrows with decomposing human by-products to injure their enemies in battle.<sup>1</sup> Even in 190BC, Hannibal is said to have been victorious over the King of Pergamum because of the tactic of firing vessels full of snake venom onto enemy ships.<sup>2</sup> Closer to modern times, more sophisticated examples of biological weapons have been recorded, as is evidenced by the release of anthrax, cholera and glanders during World War I by the Germans, who engaged in spreading plague and infecting mules in Russia, and Mesopotamia respectively.<sup>3</sup> Scroll forward further still to 1942, when the U.S. formed the War Research Service, and anthrax and botulism toxin were to be housed for potential counterforce against Germany.<sup>4</sup> During the 1950's and 1960's, the U.S. engaged in biological weapon research.

In 1951-1954, harmless organisms were released off both the east and west coasts of the U.S. to demonstrate the vulnerability of American cities to biological attacks. This weakness was tested again in 1966, when a test substance was released in the New York City subway system.<sup>5</sup>

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<sup>1</sup>Edmond Hooker, "Biological Warfare: History of Biological Warfare," E Medicine Health, [http://www.emedicinehealth.com/biological\\_warfare/article\\_em.htm](http://www.emedicinehealth.com/biological_warfare/article_em.htm), (accessed August 29, 2012).

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

In the early 1970's, President Richard Nixon led the campaign to alter previous agreements encouraging biological weapon research. He actively endorsed the 1972 Biological Weapons Convention which sought to discourage biological warfare.<sup>6</sup>

The turn of the century posed additional challenges for all likely to be affected by potential acts of bioterrorism. One year after world-wide festivities, which supposedly celebrated an evolved universe, and highlighted the ideals of a new, progressive millennium, mayhem occurred, changing the landscape of America forever. Furthermore, the progress associated with modern society has created an optimum environment for bioterrorists. Advances in technology, medicine and transportation contribute to the ease of creating, manipulating and distributing harmful biological agents or toxins. Subsequently, the push for increased bioterrorism vigilance must remain at the forefront of bioterror prevention policy. Consider the following revelation:

In December 2001, biological weapons were recovered from Al-Qaeda training camps near Kandahar, Afghanistan. Among the items found were books on biological warfare and on microbiology, dating mostly from the 1950's and 60's. . . . There were also articles from scientific journals, some fairly recent at the time, on pathogens such as *B. anthracis*, *Y. pestis*, and *C. botulinum*, as well as hepatitis viruses. Among the papers found were clear indications that Al-Qaeda had recruited at least one PhD-level scientist to help them, although apparently mostly for procuring additional scientific information. . . . There were also letters containing crude diagrams showing the general layout of a laboratory, a list of some equipment, and references to the need to train people to work in laboratory work.<sup>7</sup>

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<sup>6</sup> Jeanne Guillemin, *Biological Weapons: From the Invention of State Sponsored Programs to Contemporary Bioterrorism* (New York: Columbia University Press, 2005), chap. 6, under "The Nixon Decision," Kindle ebook.

While it is apparent that these materials were obtained prior to the orchestration of a successful bioterrorist attack, the obvious is still clear—terrorists and terrorist groups—are actively engaged in crafting and fashioning biological agents for covert use. As advances in technologies are engineered to benefit humanity, the converse is also true: advances in technologies proliferate potentials for ulterior exploits.

### **Bioterrorist Attacks are Likely**

Scholarly opinions as to whether there should be concerns about potential acts of bioterrorism vary greatly. Some individuals believe that America will likely encounter great peril and that mass casualty by means of biological agents is on the horizon.<sup>8</sup> At a hearing before the Subcommittee on Emerging Threats and Capabilities of the Senate Committee on Armed Services, Senator Kay R. Hagan, Chairman, stated:

The United States and our allies continue to be threatened by Al Qaeda and other violent extremist organizations. As we have seen in recent years, this threat emanates not only from the border region between Afghanistan and Pakistan, but also from al Qaeda franchises in Yemen, Somalia, and northwest Africa. These groups have made clear their desire to strike western and U.S. targets. We must remain mindful of the potential for these groups to execute attacks with significant and destabilizing effects, often with limited planning and at a very low cost. The 2009 Christmas Day airliner

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<sup>7</sup> William R. Clark, *Bracing for Armageddon?: The Science and Politics of Bioterrorism in America* (New York: Oxford University Press, 2008), chap. 10, under “Who Would Do It?: Groups,” Kindle ebook.

<sup>8</sup> Opinions that support anticipated bioterrorist attacks can be found in Bob Graham et al., *World at Risk: The Report Of The Commission On The Prevention Of Weapons Of Mass Destruction Proliferation And Terrorism* (New York: Vintage Books, 2008); and Senate Committee on Armed Services Subcommittee on Emerging Threats and Capabilities, *Department of Defense Plans and Programs Relating to Counterterrorism, Counternarcotics, and Building Partnership Capacity: Hearings on S. HRG. 112-182, 112<sup>th</sup> Cong., 1<sup>st</sup> sess., 2011.*

bombing attempt over Detroit is a chilling reminder of that fact.<sup>9</sup>

These words clearly indicate that extreme risk exists for the safety of the American public. In fact, the mention of terrorist practices designed to produce “significant and destabilizing effects”<sup>10</sup> magnifies the severity of the matter greatly and illuminates the need to decrease the risks. Efforts to reduce the threat of terrorism have increased greatly since the attacks of September 11; additionally, attention has been drawn to potential threats by non-traditional means and methods.<sup>11</sup> Gary Reid, Deputy Assistant Secretary of Defense for Special Operations and Combating Terrorism believes that America must be vigilant against combating untraditional types of warfare:

America’s dominance in traditional warfighting has created powerful incentives for adversaries to use alternative methods to counter U.S. influence and interests. For the foreseeable future, the most likely contingencies the United States will face will involve irregular warfare. Since 2006, my office has also been principally involved in supporting the strategic shift within the Department to improve capabilities and expand DOD capacity for irregular warfare.<sup>12</sup>

Numerous scholars, to include Senators Sam Nunn and Richard Lugar, William Patrick—bioweapons expert at Fort Detrick, MD—Defense Secretary William Cohen, and Dr. Daniel Gerstein, and a host of others, reason the likelihood of potential acts of

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<sup>9</sup> Senate Committee on Armed Services Subcommittee on Emerging Threats and Capabilities, *Department of Defense Plans and Programs Relating to Counterterrorism, Counternarcotics, and Building Partnership Capacity: Hearings on S. HRG. 112-182*, 112<sup>th</sup> Cong., 1<sup>st</sup> sess., 2011, 2.

<sup>10</sup> *Ibid.*

<sup>11</sup> *Ibid.*

<sup>12</sup> *Ibid.*, 6.

bioterrorism occurring on American soil.<sup>13</sup> In fact, Dr. Gernstein adamantly asserts, “[t]he very capabilities [biological weapons] that show such promise for increasing the longevity of humans and the quality of life of humankind have the potential to be combined in ways that could threaten and perhaps even doom the human race.”<sup>14</sup>

As far as assessing the threat of attacks on livestock or crops, some experts believe that the contamination process would be relatively simple. As long as the correct agent was chosen, the agricultural product would be impacted, as well as humans.<sup>15</sup> Jeff Bender, assistant professor in veterinary public health in the College of Veterinary Medicine at the University of Minnesota states: “. . . Category A agents—several of which can be transmitted to humans, such as plague and Ebola—are easily disseminated, though difficult to acquire.”<sup>16</sup>

### **Bioterrorist Attacks are Unlikely**

In contrast to the opinions of these experts who believe that America may be threatened by biological or chemical attacks, lies the views of several others who purport that such attacks are overly exaggerated and probably unlikely. Brian Jenkins—associated with the RAND Corporation—Scientist Milton Leitenberg, and Amy

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<sup>13</sup> William R. Clark, *Bracing for Armageddon?: The Science and Politics of Bioterrorism in America* (New York: Oxford University Press, 2008), chap. 9, under “The Politics of Bioterrorism in America,” Kindle ebook; Daniel M. Gerstein, *Bioterror in 21<sup>st</sup> Century: Emerging Threats in a New Global Environment* (MD: Naval Institute Press, 2009), under “Foreward,” Kindle ebook.

<sup>14</sup> Daniel M. Gerstein, *Bioterror in 21<sup>st</sup> Century: Emerging Threats in a New Global Environment* (MD: Naval Institute Press, 2009), under “Foreward,” Kindle ebook.

<sup>15</sup> Michael A. Gips, “Protection of U.S. Agriculture Against Bioterror Attacks Has Been Strengthened,” in *Fighting Bioterrorism*, ed. Lisa Yount (Michigan: Greenhaven Press, 2004), 41.

<sup>16</sup> *Ibid.*

Smithson, former Director of the Stimson Center's Chemical and Biological Weapons Nonproliferation Project, examine the improbability of successful attacks of disastrous bioterrorism crippling America, and question the extent of the threat.<sup>17</sup>

The subject of unconventional [biological] terrorism was tailor-made for hyperbole, and unfortunately much of what has been said has made it difficult to ascertain the gravity of the unconventional terrorist threat. Taken together, the technical realities, actual case histories, and statistical records of terrorist behavior with chemical and biological substances undercut the rhetoric considerably and point not to catastrophic terrorism but to small attacks where a few, not thousands, would be harmed.<sup>18</sup>

A review of the relevant scholarly literature, surfacing at various times, debunking the inevitable possibility of bioterrorist attacks, suggests that it is unlikely that biological weaponry will be used because this science has not been used as a regular form of warfare, the technology required to produce and launch any viable attack would require highly specialized laboratories, and that the level of destruction by these agents is so implausible that it must be rejected.<sup>19</sup>

Although some experts profess the ease by which animal or crop contamination could occur, others argue that attacks on agriculture would not be the most effective

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<sup>17</sup> William R. Clark, *Bracing for Armageddon?: The Science and Politics of Bioterrorism in America* (New York: Oxford University Press, 2008), chap. 9, under "The Politics of Bioterrorism in America," Kindle ebook.

<sup>18</sup> Amy Smithson, Director of the Stimson Center's Chemical and Biological Weapons Nonproliferation Project offered this opinion in regard to America's efforts to defend against bioterrorism, *Ibid.*

<sup>19</sup> D.A. Henderson, "Bioterrorism as a Public Health Threat," Special Issue, *Emerging Infectious Diseases* 4, no. 3 (July-September 1998): 488.

approach to ensure human catastrophe.<sup>20</sup> Dr. Peter Chalk, associated with the RAND Corporation, states: “Terrorists gravitate toward visually glaring and strong pictures. Killing cows probably doesn’t fulfill that kind of mindset. In addition, many animal diseases have no real effect on humans.”<sup>21</sup>

While both points of view, the opinion that bioterrorist attacks are theoretical only, as well as the opinion that biological attacks are imminent, offer conflicting contributions to the breadth of knowledge available when assessing the threat of America’s vulnerability to attacks by biological or chemical agents, creating effective anti-terrorism policy requires careful examination of both philosophies in order to determine what is in the best interest of America’s safety. Dr. Jessica Stern, an established terrorism expert and member of the Council on Foreign Relations, suggests a middle-of-the-road approach to the threat of bioterrorism in America. She maintains that although biological weaponry attacks are not likely to be mainstream occurrences, it would be in the best interest of the public’s health to explore countermeasures, regardless of whether severe biological attacks occur or not.<sup>22</sup>

The use of biological agents as weapons has evolved over the course of thousands of years. History has shown that while the techniques used by the aggressor may have changed, the underlying motivations have remained constant—to create harm and

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<sup>20</sup> Michael A. Gips, “Protection of U.S. Agriculture Against Bioterror Attacks Has Been Strengthened,” in *Fighting Bioterrorism*, ed. Lisa Yount (Michigan: Greenhaven Press, 2004), 41.

<sup>21</sup> Ibid.

<sup>22</sup> Jessica Stern, “The Prospect of Domestic Bioterrorism,” Special Issue, *Emerging Infectious Diseases* 5, no. 4 (July-August 1999): 517-522.

destruction as necessary. As varying creeds and viewpoints regarding bioterrorism continue to emerge, the philosophy of the defender must remain constant—to prevent harm and destruction when necessary.

## CHAPTER THREE

### ASSESSING THE THREAT OF ACTS OF BIOTERRORISM

The Centers for Disease Control and Prevention (CDC) defines Bioterrorism as: “the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants.”<sup>1</sup> Biological agents and toxins are living organisms, existing in nature, available in a variety of forms like viruses, bacteria and rickettsia (“bacteria that can live inside host cells”).<sup>2</sup> Chemical agents are usually man-made products that are non-living and require direct contact with the intended target.<sup>3</sup> Both types of substances prove to be life threatening and extremely dangerous when used as weapons against life forms in society.

A plethora of choices exist for all contemplating acts of bioterrorism; however, plausibility of use is the determining factor for individuals wishing to engage in biological or chemical warfare. Terrorists do not need highly complicated or refined tools to cause havoc. They would likely only consider the economic feasibility of creating or producing the weapon of choice, consider the target audience, and consider the scope of the envisioned damage.

The ability to prevent a terrorist from acquiring, processing and weaponizing biological material is limited. Deadly pathogens are naturally occurring, and with the proliferation in the life sciences of knowledge, equipment, and capabilities, these collective steps

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<sup>1</sup>Centers for Disease Control and Prevention, “Bioterrorism Overview,” Centers for Disease Control and Prevention, <http://www.bt.cdc.gov/bioterrorism/overview.asp> (accessed September 16, 2012).

<sup>2</sup> Matthew Morgan, “The Origins of the New Terrorism,” *Parameters* (Spring 2004): 37.

<sup>3</sup>Ibid.

have experienced a lowering of thresholds that allows for more biotechnology in the hands of a larger number of people. Equipment for fermentation, freeze drying and milling-which can be found readily in local hardware stores or ordered from the comfort of one's home-allows for developing and weaponizing these biological capabilities. In short, biological material suitable for use in an attack has become less technically challenging and therefore made these biological capabilities more readily available.<sup>4</sup>

### **A Review of Plausible Biological and Chemical Agents**

Of the thirty-three agents listed by the CDC as likely bioterrorism agents, the following agents have been identified as the most potent choices likely to be used by individuals intending to create harm: Salmonella, Anthrax, Smallpox, Plague, Botulism, Ricin and Tularemia.<sup>5</sup> In addition to the aforementioned bacterial choices, specific chemical compounds, such as Fluoroacetates and Organophosphorous, as well as Organophosphate TEPP, and Sarin Nerve Agent, are considered to be probable toxic, and lethal, alternatives for terrorists desirous of launching bioterrorist attacks against people, animals or crops.<sup>6</sup>

While several agents and compounds are described as being potential choices for biological weaponry, Salmonella typhimurium, Anthrax, Ricin and Sarin Nerve Gas have been manufactured, with documented case histories, in recent decades, as agents of bioterrorism.

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<sup>4</sup> Daniel Gerstein, "Bioterror in the Age of Biotechnology," *Joint Force Quarterly* 57 (2<sup>nd</sup> quarter 2010): 83.

<sup>5</sup> Centers for Disease Control and Prevention, "Bioterrorism Agents/Diseases," Centers for Disease Control and Prevention, <http://www.bt.cdc.gov/agent/agentlist.asp> (accessed September 16, 2012).

<sup>6</sup> Jewish Virtual Library, "Chemical Terrorism," The American-Israeli Cooperative Enterprise, <http://www.jewishvirtuallibrary.org/jsourc/Terrorism/chemterror.html> (accessed July 18, 2012).

## **Salmonella typhimurium Used as a Biological Weapon**

Salmonella typhimurium is a rod-shaped bacterium, capable of flourishing with oxygen or without. While some species are prevalent and exist everywhere, other types adapt to specific environments. In humans, Salmonella typhimurium can cause acute gastroenteritis, which typically occurs from food-borne infections.<sup>7</sup>

Salmonella typhimurium was linked to the largest biological attack in United States (U.S.) history, with over 700 people becoming ill, as recently as 1984. In fact, the Rajneeshees, a radical group led at the time by Bhagwan Shree Rajneesh of India, created havoc in the state of Oregon, simply as an act of violence to express their dissatisfaction with government officials in Oregon's Wasco County. Initially, the plan was to only cause illness to the county officials who posed a threat to the group's plan of expansion; however, the scheme became much grander and included attacks on innocent people. The Rajneeshees' elaborate plan attacked people where they ate in the town. Restaurant patrons were targeted as vials of salmonella toxin were poured into salad bars across the county. Hundreds were sickened and hospitals were packed with signs of the devastation. The event was bioterrorist successful and remained totally undetected by the CDC

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<sup>7</sup> Kenneth Todar, "Lectures in Microbiology: Salmonella and Salmonellosis," University of Wisconsin-Madison Department of Bacteriology, <http://textbookofbacteriology.net/themicrobialworld/Salmonella.html> (accessed September 22, 2012).

officials, although a complete investigation was performed after the outbreak. The nature of the outbreak was undetected for over a year.<sup>8</sup>

### **Bacillus anthracis Used as a Biological Weapon**

Bacillus anthracis is a bacterium that exists in nature in two forms: a vegetative form, which actively grows, and a dormant form, as a spore. Bacillus anthracis spores are capable of existing for long periods of time without nutrients or water. Once the spores occupy the environment of the host, they sprout contributing to the disease Anthrax.<sup>9</sup>

Anthrax can occur in humans in several forms to include cutaneous anthrax<sup>10</sup> and inhalational anthrax.<sup>11</sup> Cutaneous anthrax enters the body through cuts in the skin, while inhalational anthrax results from breathing spores into the lungs.<sup>12</sup> In humans, if anthrax remains untreated, the results can be fatal.

The Anthrax Letter Cases, involving the biological agent Bacillus anthracis, contributed to several months of fear and uneasiness for the American public. In the autumn of 2001, approximately five envelopes containing anthrax were mailed to two Senators and several media organizations in New York City and Florida. Between September 17, 2001, and November 17, 2001, the contaminated documents were handled

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<sup>8</sup> Marc L. Ostfield, "Bioterrorism as a Foreign Policy Issue," *SAIS Review* XXIV, no. 1 (Winter-Spring 2004): 136.

<sup>9</sup> Center for Biosecurity of UPMC, "Bacillus anthracis (Anthrax)," Center for Biosecurity of UPMC, [http://www.upmc-biosecurity.org/website/our\\_work/biological-threats-and-epidemics/fact\\_sheets/anthrax.html](http://www.upmc-biosecurity.org/website/our_work/biological-threats-and-epidemics/fact_sheets/anthrax.html) (accessed July 18, 2012).

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

and opened by various individuals within the U.S., resulting in the deaths of five people. In addition to the five deaths, 31 other individuals tested positive for exposure to anthrax spores, and ten thousand more people deemed “ ‘high risk for exposure’ underwent antibiotic prophylaxis.”<sup>13</sup> It was not until 2008 that the Federal Bureau of Investigation (FBI) and the Department of Justice, announced that they had documented evidence showing who was responsible for the attacks. Dr. Bruce Ivins, a scientist employed by the Army Medical Research Institute of Infectious Diseases in Frederick, Maryland, was the sole individual responsible for the 2001 anthrax letter incidents which devastated the U.S.<sup>14</sup>

### **Ricin Used as a Biological Weapon**

Ricin is a highly toxic protein found in the seed of the castor bean. Castor beans are processed to make castor oil. Ricin is a by-product of the waste left after castor oil is produced; it exists in powder form, mist form or pellet form, and is easily dissolved in liquids.<sup>15</sup> Exposure to ricin can occur from ingestion or inhalation of one of the forms. Depending on the type of exposure, as well as the dosage, respiratory distress, liver and kidney damage, or even death may occur.<sup>16</sup>

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<sup>13</sup> The United States Department of Justice, *Amerithrax Investigative Summary*, 2010, (Washington, DC, 2-3) <http://www.justice.gov/amerithrax/docs/amx-investigative-summary.pdf>

<sup>14</sup> *Ibid.*, 6-12.

<sup>15</sup> Centers for Disease Control, “Facts about Ricin,” Centers for Disease Control, <http://www.bt.cdc.gov/agent/ricin/facts.asp> (accessed September 22, 2012).

<sup>16</sup> *Ibid.*

Ricin was linked to a domestic bioterror plot in November of 2011. Four gentlemen, residing in the state of Georgia, were planning and preparing to attack known political figures to include federal judges, Justice Department officials and Internal Revenue Service agents with the toxic biological agent ricin. The men planned to terrorize individuals in several states and cities including Washington, Atlanta, New Orleans and Jacksonville, Florida.<sup>17</sup> The motive behind the plot and impending attacks was revealed by one of the suspects: “a bucket list of politicians, government officials, corporate leaders and media figures should be targeted to make the country right again.”<sup>18</sup>

### **Sarin Nerve Gas Used as a Chemical Weapon**

Sarin is a nerve gas with the chemical formula  $C_4H_{10}FO_2P$ .<sup>19</sup> It is odorless, tasteless, and without color. Exposure to sarin can occur by ingesting the product, or through contact with sarin vapor. Sarin poisoning depends on the type of exposure, as well as the length of time of the exposure. Neurological problems, respiratory discomfort or failure, and even death may occur in mild to severely exposed individuals.<sup>20</sup>

Sarin nerve gas, the chemical compound used in the Matsumoto, Japan dormitory terrorist attack and Tokyo, Japan subway terrorist attack of 1994 and 1995, is listed by

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<sup>17</sup> Cable News Network, “Militia Members Plotted to Kill Officials, Prosecutors Say,” Turner Broadcasting System, <http://www.cnn.com/2011/11/01/justice/georgia-militia-arrests/> (accessed September 19, 2012).

<sup>18</sup> Ibid.

<sup>19</sup> Noblis Inc., “Chemistry of GB (Sarin)” Noblis, Inc., <http://www.noblis.org/MissionAreas/hsi/ChemistryofLethalChemicalWarfareAgents/Pages/Sarin.aspx> (accessed September 22, 2012).

<sup>20</sup> Centers for Disease Control, “Facts About Sarin,” Centers for Disease Control, <http://emergency.cdc.gov/agent/sarin/basics/facts.asp> (accessed September 20, 2012).

the CDC as a lethal, human-made chemical warfare agent.<sup>21</sup> While there have not been any terrorist attacks in the U.S. using this agent, the incidents reported in Japan, led by the terrorist group Aum Shinrikyo, were frightful, as they traumatized a nation and caused feelings of trepidation in other parts of the world. The initial attack by Aum Shinrikyo was launched against a dormitory, housing three judges who were to hear the matter of a real-estate dispute involving the group. Sarin gas was released in the neighborhood where the dormitory was located. The gas spread throughout the location, infiltrating the dormitory, and other dwellings as well. The attack resulted in the deaths of seven individuals, and hundreds of others were injured.<sup>22</sup>

The most publicized event by this terrorist organization is their attack on the morning of March 20, 1995. Tokyo's subway system experienced the release of sarin gas, occurring on five different trains, simultaneously. Packages containing the chemical were strategically placed on five trains; upon punctures by sharpened objects, the gases were discharged, permeating the subway cars. The effects were felt throughout central Tokyo—approximately 3800 individuals were injured and twelve individuals killed.<sup>23</sup>

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<sup>21</sup> Centers for Disease Control, "Facts About Sarin," Centers for Disease Control, <http://emergency.cdc.gov/agent/sarin/basics/facts.asp> (accessed September 20, 2012).

<sup>22</sup> Kyle B. Olson, "Aum Shinrikyo: Once and Future Threat?" Special Issue, *Emerging Infectious Diseases* 5, no. 4 (July-August 1999): 513-516.

<sup>23</sup> *Ibid.*

## **Techniques for Disseminating Biological and Chemical Weapons**

Eating, breathing and drinking are commonplace activities, imperative to life, yet, they are activities that expose life to potential harm.<sup>24</sup> “If potential terrorists want to introduce germs into the bodies of living organisms, while by-passing normal immune defenses, then food, water and inhaled air are super highways to vital organs.”<sup>25</sup>

Once bioterrorists have determined what weapons they will use, the method of dissemination must be considered in order to maximize the results. Weapons which are capable of being released through air, or through water, as well as those which affect food, and contaminate agriculture, are among the most popular for bioterrorists.

### **Aerosol Dissemination**

Biological or chemical attacks may be carried out by using aerosol sprayer technology, or the like. Most commercial grade spraying devices or medical grade aerosol therapy devices would be effective when used in this manner. Optimum aerosol delivery varies depending on the particulate. “Effective aerosol dissemination of a biological agent requires spraying or otherwise producing agent particles of 1 to 5 micron size, easy to inhale deep into the lungs and small enough to remain suspended in the

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<sup>24</sup> Michael T. Osterholm and John Schwartz, *Living Terrors: What America Needs To Know To Survive The Coming Bioterrorist Catastrophe* (New York: Dell Publishing, 2000), chap. 4, under “A Weapons Delivery System,” Kindle ebook.

<sup>25</sup> Ibid.

air.”<sup>26</sup> Bacillus anthracis, ricin and sarin are all probable choices if aerosol dissemination is considered.

### **Water Contamination**

Water for use by drinking, or irrigation, can be tainted rather easily. “Effective chemical and biological threats involving water only require that the agents be toxic and stable in a water environment and resistant to chlorine.”<sup>27</sup> Biological and chemical agents such as anthrax, hydrogen cyanide and cholera are still toxic in water, and capable of causing grave illness and harm.<sup>28</sup> Treatment facilities can be sources of prevention from harm, as well as points of entry for attacks by biological or chemical means. While treatment plants seek to protect local water supplies from potential dangers, they are also where harmful chemicals can be added to the water supply. Water treatment facilities, and water storage plants, are ideal entry points for possible contaminants to be added to water systems, as they would affect all of the water being dispersed through the system.<sup>29</sup>

### **Food Contamination**

Food contamination has successfully been established as a method of bioterrorism, as is evidenced by the salmonella attack performed by the Rajaneeshee

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<sup>26</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack*, ed. Michael E. Brown, Sean M. Lynn-Jones, and Steven E. Miller (Massachusetts: The MIT Press, 1998), 121.

<sup>27</sup> Donald Hickman, “A Chemical And Biological Warfare Threat: USAF Water Systems at Risk,” *The Counterproliferation Papers*, no. 3 (September 1999): 18-19 <http://www.au.af.mil/au/awc/awcgate/cpc-pubs/hickman.html> (accessed August 6, 2012).

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

group. Successful bioterrorist attacks on food supplies would likely target foods usually consumed raw and unprocessed, as cooking food to high temperatures would in all probability destroy harmful pathogens and toxins.<sup>30</sup>

### **Agricultural Contamination**

Biological or chemical agents can be used against crops and livestock. This choice is conducive for terrorists who may want to sicken mass quantities of people and devastate economies dependant on crops, and or cattle, all while remaining somewhat undetected. In addition, because animals are often transported several times throughout their life-spans for rearing and slaughtering, the increase in transmission of naturally occurring diseases, as well as deliberately caused ailments is likely. This practice makes wide-spread agricultural contamination probable. Bacillus anthracis, as well as camel pox, a substitute for small pox, are examples of biological agents which are effective when used in this manner.<sup>31</sup>

### **Monitoring and Responding to the Possession of Biological Agents**

The threat of domestic cases of bioterrorism is a major concern; a concern that is comprehensive when considered in its entirety. Ideally, perfect biological weaponry choices would be those needed in small quantities, those which are easily manufactured or acquired, and most importantly, those which are somewhat obscure and perhaps even

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<sup>30</sup> Seth Carus, "The Threat of Bioterrorism," National Defense University Forum, forum 127 posted September 1997, <http://www.au.af.mil/au/awc/awcgate/ndu/forum127.htm> (accessed August 18, 2012).

<sup>31</sup> Jonathan Ban, "Agricultural Biological Warfare: An Overview," Chemical and Biological Arms Control Institute, <http://www.ncjrs.gov/App/publications/abstract.aspx?ID=189887> (accessed September 22, 2012).

microscopic. *World at Risk*, a report by the Commission on the Prevention of Weapons of Mass Destruction, Proliferation and Terrorism, reveals that most biological pathogens are “poorly secured and widely available for sinister purposes.”<sup>32</sup> Myriad resources are available to extremists and terrorist organizations desirous of launching attacks of bioterrorism on American soil. “It is unknown exactly how much and which types of biological weapons may be on the black market or in unauthorized hands, since the dissolution of the Soviet Union, the Warsaw Pact, and subsequent logistical chaos in the former Red Army.”<sup>33</sup> And even still, closer to home, specifically here on American soil, fields of study which include biomedical engineering, pharmaceuticals, and agriculture require specific biotechnological proficiencies which can easily be incorporated into biological weaponry, making it more difficult to detect and identify the existence of harmful agents, and subsequently, protect against the harm they may cause.<sup>34</sup>

The defense community at large realizes that biological agents and toxins are available to individuals whom may not seek to act in the best interest of others. Moreover, the defense community also recognizes that while countermeasures may exist to limit the proliferation of harmful biological and chemical agents, timely identification

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<sup>32</sup> Bob Graham et al., *World at Risk: The Report Of The Commission On The Prevention Of Weapons Of Mass Destruction Proliferation And Terrorism* (New York: Vintage Books, 2008), xvi.

<sup>33</sup> Francis Taylor is the Assistant Secretary for Diplomatic Security and Director of Office of Foreign Missions for the U.S. Department of State .This information was presented before the National Black Prosecutors Association in Atlanta, Georgia on August 13, 2003, to bring awareness to the threat of bioterrorism. Francis X. Taylor, “Bioterrorism and Homeland Security,” <http://bioterrereurope.wikispaces.com/file/view/Bioterrorism+and+Homeland+Security.pdf> (accessed August 12, 2012).

<sup>34</sup> Daniel M. Gerstein, *Bioterror in 21<sup>st</sup> Century: Emerging Threats in a New Global Environment* (MD: Naval Institute Press, 2009), under “Foreward,” Kindle ebook.

of bioterrorist activity, as well as distribution of medicines to combat the affects of these harmful agents may be difficult. Subsequently, the following piece of legislation was introduced to lessen, and hopefully prevent, acts of biological warfare.

*Executive Order 13546, Optimizing the Security of Biological Select Agents and Toxins in the United States*, enforces the position of the U.S. government to maintain stricter controls over the safe-keeping of select agents located in the U.S. This legislation mandates that biological select agents and toxins be secured according to their level of risk or potential abuse, and encourages ongoing multidisciplinary participation, as to which agents will be classified, reclassified or declassified as threats to public safety, from subject matter experts in the following government agencies: the Department of State; the Department of Defense; the Department of Justice; the Department of Agriculture; the Department of Commerce; the Department of Health and Human Services; the department of Transportation; the Department of Labor; the Department of Energy; the Department of Veterans Affairs; the Department of Homeland Security; the Environmental Protection Agency; the Office of the Director of National Intelligence; the Office of Science and Technology Policy; and the Joint Chiefs of Staff.<sup>35</sup> Implementation of this legislation is consistent with other approved government policies, conditional upon applicable law and availability of appropriations.<sup>36</sup>

Biodefense philosophies and methodologies differ from agency to agency, as due resources and approaches to achieving objectives. Nevertheless, Congressional oversight

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<sup>35</sup> Executive Order no. 13546, *Code of Federal Regulations*, title 3, p. 39439 (July 2, 2010).

<sup>36</sup> *Ibid.*

has allowed for legislation that serves to identify, and seeks to prevent, potential biological threats from disrupting life for the American public. *The Pandemic and All Hazards Preparedness Act*, the *Project Bioshield Act of 2004*, and the *MedKit Prototype Program* are three such pieces of legislation.

*The Pandemic and All Hazards Preparedness Act*, requires the creation of the National Biodefense Science Board, which serves to provide guidance to the Department of Health and Human Services as to whether current and future biological and chemical toxins and agents are considered naturally occurring, accidental or deliberate. Expert guidance is expected to critically analyze opportunities that advances in the biological, biotechnological and genetic engineering sciences may present, with respect to threats posed by chemical, biological, radiological and nuclear agents. Furthermore, the National Biodefense Science Board is expected to provide recommendations, if and when appropriate, to expand and intensify biodefense research.<sup>37</sup>

*The Project Bioshield Act of 2004*, Section 3, Biomedical Countermeasures Procurement, SEC 319F2, Strategic National Stockpile, authorizes the Secretaries of the Departments of Health and Human Services and Homeland Security to maintain a stockpile of drugs, vaccine and other biological products, in amounts determined appropriate to provide for the emergency health security in the event of a bioterrorist attack or other public health emergency. The Secretaries are also required to ensure that appropriate procedures are followed to ensure for the physical security of the stockpile, ensure the contents of the stockpile are relevant to meet emergency threats and advanced

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<sup>37</sup> *Pandemic and All-Hazards Preparedness Act*, S 7638, 109<sup>th</sup> Cong., 2<sup>nd</sup> sess. (January 3, 2006), 42.

technologies, and required to manage the effective distribution of the stockpiled materials to respond to actual or potential emergency needs. Additionally, the Secretary of Homeland Security is authorized to solicit approval from the President to approve the release of reserve funds to finance these countermeasures if needed. Authorized appropriations to finance these Biomedical Countermeasure Procurements amount to the sum of \$640,000,000 annually, in addition to the special reserve fund.<sup>38</sup>

The Centers for Disease Control in partnership with the Food and Drug Administration, introduced the *Emergency MedKit Prototype Program* to serve as a line of defense against potential outbreaks of harmful biological agents. The MedKit consisted of a five-day supply of antibiotics, with complete instructions, to be used in the event of an anthrax attack. The pilot program was tested in St. Louis, Missouri and surrounding counties. Overall, the pilot program fared well; the majority of the program participants agreed that they would like to have a MedKit always available in their homes. The FDA required additional testing of the MedKit, and upon successfully meeting all regulatory requirements, hope to have the program fully operational and available to the American public at large by 2010.<sup>39</sup>

*Executive Order 13527 Establishing Federal Capability for the Timely Provision of Medical Countermeasures Following a Biological Attack*, signed into law with the

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<sup>38</sup> Project Bioshield Act of 2004, Public Law 108-276, 108<sup>th</sup> Cong., U.S. Statutes at Large 118 (2004): 842-852.

<sup>39</sup> Centers for Disease Control, "CDC's Division of Strategic National Stockpile Emergency MedKit Evaluation Study Summary," Centers for Disease Control, <http://www.bt.cdc.gov/agent/anthrax/prep/pdf/medkit-evaluation-summary-2007.pdf> (accessed September 15, 2012).

intent to lessen illness and prevent death in the event of a biological attack, authorizes the United States Postal Service to provide for express delivery of medical countermeasures for use by individuals in the event of a “large-scaled biological attack.”<sup>40</sup> This Presidential Document also mandates that the Secretaries of the Departments of Health and Human Services, Homeland Security and Defense, establish a Federal response plan that allows for rapid delivery to all affected areas in the event of large-scaled biological attacks.<sup>41</sup>

In addition to *Executive Order 13546, Section 2332a of Title 18, US Code* and *Section 175 of Title 18 US Code* serve to reduce the threat of biological agents being used in attacks against American society. Section 2332a establishes the enforcement of strict punishments on individuals who use, or threaten to use, any devices “designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors; any weapon involving a biological agent, toxin, or vector. . . .”<sup>42</sup> These punishments range from prison time to death, depending upon the nature of the offense, and whether any lives were lost as a result of the event. Section 175 of Title 18 US Code specifically enforces punishments against individuals who may use biological agents to cause harm, specifically, “whoever knowingly develops, produces, stockpiles, transfers, acquires, retains, or possesses any

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<sup>40</sup> Executive Order no 13527, *Code of Federal Regulations*, title 3, p. 737 (December 30, 2009).

<sup>41</sup> Ibid.

<sup>42</sup> 18 U.S.C. § 2332a: Use of weapons of mass destruction  
<http://uscode.house.gov/download/pls/18C113B.txt>

biological agent, toxin, or delivery system for use as a weapon, or knowingly assists a foreign state or organization to do so, or attempts, threatens, or conspires to do the same. . . .”<sup>43</sup> Likewise, these punishments include imprisonment, and fines may also be imposed, as well.

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<sup>43</sup> 18 U.S.C. § 175: Prohibitions with respect to biological weapons  
<http://uscode.house.gov/download/pls/18C10.txt>

## CHAPTER FOUR

### POTENTIAL ECONOMIC AND PUBLIC HEALTH IMPACTS

Is the American public today truly aware of the potential devastation likely if acts of bioterrorism were to occur in the homeland? The economic impact and public health impact would be baffling. It is estimated that the economic impact of an attack by biological agents can range from \$477.7 million per 100,000 people exposed to \$26.2 billion per 100,000 people, depending on the agent.<sup>1</sup> This estimate does not include the possibility of extended human illness and treatment costs associated with extended care, or the possibility of decontamination and disposal of potentially hazardous waste materials.<sup>2</sup> Additionally, of note, this estimate does not address variances in target population, such as those agents or toxins that may affect agriculture initially, then, pose secondary threat to human existence. These types of invasions are often overlooked by the general public at large, and perhaps even considered miniscule in the grand scheme of human survival; however, it is important to bring awareness to the magnitude of economic disruption and social interruption possible if acts of bioterror were to affect crops and livestock. Agriculture constitutes 1% of the U.S. gross domestic product; when considered in totality, agribusiness accounts for 12-15% of the gross domestic product.<sup>3</sup>

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<sup>1</sup> Arnold Kaufmann, Martin Meltzer, and George Schmid, "The Economic Impact of a Bioterrorist Attack: Are Prevention and Postattack Intervention Programs Justifiable?" *Emerging Infectious Diseases* 3, no. 2 (April-June 1997): 83.

<sup>2</sup> Ibid.

<sup>3</sup> The Industrial College of the Armed Forces, *2010 Final Report: Agribusiness Industry* (Washington, D.C: National Defense University, 2010), 2.  
<http://www.ndu.edu/es/programs/academic/industry/reports/2010/pdf/icaf-is-report-agribusiness-2010.pdf>;  
John B. Penson, Jr. et al., *Introduction to Agricultural Economics* (New Jersey: Prentice Hall, 2010), 17.

By utilizing the stated statistical estimate, one can determine the approximate economic range of what it would cost to manage a real-time, biological attack occurring in a populated area, such as a suburb, or major metropolis. The U.S. is home to major cities, each contributing valuable capital that serve to enhance the American way of life. Of the various choices available for consideration, the following five U.S. cities were chosen to demonstrate the potential economic and public health impacts that acts of bioterrorism would cause: New York (NY), Los Angeles (CA), Chicago (IL), Washington (D.C.), and Hartford(CT).

### **Real Time Estimate of a Biological Attack on New York, New York**

New York, New York is known as home of the New York Stock Exchange, the largest stock exchange in the world. The 2010 U.S. Census reports the population of New York as 8,175,133.<sup>4</sup> If New York were to experience one attack by one biological agent, the economic impact and public health impact would range between \$39 billion and \$2.1 trillion, as noted below:

Minimum Economic Impact= (Population exposed/100,000) x (\$477.7M)

Maximum Economic Impact= (Population exposed/100,000) x (\$26.2B)

Minimum Economic Impact for New York, New York:

$$(8,175,133/100,000) \times (\$477.7M) = \$39.05261B$$

Maximum Economic Impact for New York, New York:

$$(8,175,133/100,000) \times (\$26.2B) = \$2.14188T$$

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<sup>4</sup> United States Census 2010, "Interactive Population Search: New York, New York," United States Census 2010, <http://2010.census.gov/2010census/popmap/> (accessed August 18, 2012).

### **Real Time Estimate of a Biological Attack on Los Angeles, California**

California is the most populated state in the U.S., and Los Angeles is the largest populated city within that state.<sup>5</sup> The 2010 U.S. Census reports the population of Los Angeles, California as 3,792,621.<sup>6</sup> If Los Angeles were to experience one attack by one biological agent, the economic impact and public health impact would range between \$18.1 billion and \$993.6 billion, as noted below:

Minimum Economic Impact for Los Angeles, California:

$$(3,792,621/100,000) \times (\$477.7M) = \$18.11735B$$

Maximum Economic Impact for Los Angeles, California:

$$(3,792,621/100,000) \times (\$26.2B) = \$993.67B$$

### **Real Time Estimate of a Biological Attack on Chicago, Illinois**

Chicago, Illinois is the third most populous city in the U.S.,<sup>7</sup> and is also home to the Chicago Board of Trade, where agricultural commodities are traded. The 2010 U.S. Census reports the population of Chicago, Illinois as 2,695,598.<sup>8</sup> If Chicago were to experience one attack by one biological agent, the economic and public health impact would range between \$12 billion and \$706.2 billion, as noted below:

Minimum Economic Impact for Chicago, Illinois:

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<sup>5</sup> United States Census 2010, "Interactive Population Search: Los Angeles City, California," United States Census 2010, <http://2010.census.gov/2010census/popmap/> (accessed August 18, 2012).

<sup>6</sup> Ibid.

<sup>7</sup> United States Census 2010, "Interactive Population Search: Chicago, Illinois," United States Census 2010, <http://2010.census.gov/2010census/popmap/> (accessed August 18, 2012).

<sup>8</sup> Ibid.

$$(2,695,598/100,000) \times (\$477.7\text{M}) = \$12.87687\text{B}$$

Maximum Economic Impact for Chicago, Illinois:

$$(2,695,598/100,000) \times (\$26.2\text{B}) = \$706.25\text{B}$$

### **Real Time Estimate for a Biological Attack on Washington, District of Columbia**

Washington, District of Columbia is commonly known as the center of U.S. Government, and is the capital of the U.S. The 2010 U.S. Census reports the population of Washington, District of Columbia as 601,723.<sup>9</sup> If Washington were to experience one attack by one biological agent, the economic and public health impact would range between \$2.8 billion and \$157.6 billion, as noted below:

Minimum Economic Impact for Washington, District of Columbia:

$$(601,723/100,000) \times (\$477.7\text{M}) = \$2.87443\text{B}$$

Maximum Economic Impact for Washington, District of Columbia:

$$(601,723/100,000) \times (\$26.2\text{B}) = \$157.65\text{B}$$

### **Real Time Estimate of a Biological Attack on Hartford, Connecticut**

Hartford, Connecticut has long been referred to as the “Insurance Capital of the World.”<sup>10</sup> It is one of the oldest cities in the U.S. The 2010 U.S. Census reports the population of Hartford, Connecticut as 124,775.<sup>11</sup> If Hartford were to experience one

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<sup>9</sup> United States Census 2010, “Interactive Population Search: Washington, District of Columbia,” United States Census 2010, <http://2010.census.gov/2010census/popmap/> (accessed August 18, 2012).

<sup>10</sup> Helium, “How did Hartford become the Insurance Capital of the World?” Helium, <http://www.helium.com/items/1580860-how-did-hartford-become-known-as-the-insurance-capital-of-the-world> (accessed August 18, 2012).

<sup>11</sup> United States Census 2010, “Interactive Population Search: Total Population: Geographic Levels: Hartford, Connecticut,” United States Census 2010, <http://2010.census.gov/2010census/popmap/> (accessed August 18, 2012).

attack by one biological agent, the economic and public health impact would range between \$596 million and \$32 billion, as noted below:

Minimum Economic Impact for Hartford, Connecticut:

$$(124,775/100,000) \times (\$477.7\text{M}) = \$596.05\text{M}$$

Maximum Economic Impact for Hartford, Connecticut:

$$(124,775/100,000) \times (\$26.2\text{B}) = \$32.69\text{B}$$

While the aforementioned scenarios were given to emphasize the economic devastation possible from an arbitrary attack by a randomly selected biological agent on one U.S. city, the following example will specifically highlight the calamitous nature of an attack by sarin nerve agent on the largest populated city in the U.S. In addition, estimated clean-up costs will be calculated, based on the cost factor used by the Environmental Protection Agency (EPA) when the organization orchestrated the clean-up process, which typically includes decontamination and disposal of hazardous materials, for Capitol Hill following the attack by a biological agent in 2001.

### **The Impact of a Chemical Attack by Sarin Nerve Agent on New York, NY**

The U.S. Congress, Office of Technology Assessment (OTA) estimates that an open air, single point attack of sarin nerve agent, likely to cause significant harm (death) in a normal urban area would require 300 kilograms of sarin (median lethal dosage), spread over 0.22 square kilometers, resulting in a population exposure of 660 to 2200 people, likely causing the deaths of 60-200 people.<sup>12</sup> Utilizing the aforementioned ratio of

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<sup>12</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack*, ed. Michael E. Brown, Sean M. Lynn-Jones, and Steven E. Miller (Massachusetts: The MIT Press, 1998), 149.

chemical agent to area affected, the following scenario represents New York's exposure in the event of a sarin attack. Of note, New York is 715.03 square kilometers in area:<sup>13</sup>

Mass of agent=

$$(\text{Area of City Affected}/\text{OTA Given Area}) \times (\text{Medial Lethal Dosage})$$

Minimum/Maximum Population Exposed=

$$(\text{Area of City Affected}/\text{OTA Given Area}) \times (\text{OTA Given Pop. Exp.})$$

Minimum/Maximum Estimated Fatalities=

$$(\text{Min/Max Pop. Exp.}) \times (\text{OTA Given Est. Fatalities}/\text{OTA Given Pop. Exp.})$$

Lethal Mass of Sarin=

$$(715.03 \text{ sq km} / 0.22 \text{ sq km}) \times 300\text{kg} = 975,041 \text{ kg}$$

Minimum/Maximum Population Exposed=

$$(715.03 \text{ sq km} / 0.22 \text{ sq km}) \times (660 \text{ to } 2200) = 2,145,090 \text{ to } 7,150,300$$

Minimum/Maximum Estimated Fatalities=

$$(2,145,090 \text{ to } 7,150,300) \times (60 \text{ to } 200) / (660 \text{ to } 2200) = 195,008 \text{ to } 650,027$$

### **Cost for EPA Clean-up Following a Biological Attack**

The Department of Justice reports that \$27 million was spent from the Superfund Program to assist with the clean-up of Capitol Hill after an attack by a biological agent in 2001.<sup>14</sup> Capitol Hill is 3000 square feet<sup>15</sup> (approximately  $1.2076101928 \times 10^{-4}$  square

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<sup>13</sup> IDcide Local Information Data Server, "New York Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/ny/new-york.htm> (accessed August 18, 2012).

<sup>14</sup> The United States Department of Justice, *Amerithrax Investigative Summary*, 2010, 3. <http://www.justice.gov/amerithrax/docs/amx-investigative-summary.pdf>

miles) resulting in a clean-up cost of \$9,000 per square foot. By utilizing this clean-up cost factor, the estimated EPA cost to clean-up the aforementioned five cities, in the event of a biological attack is listed below:

EPA Clean-up Cost per square mile=

$$(\$9,000 \text{ p/sq ft}) \times (27878400 \text{ sq ft})^{16} = \$250,905.6\text{M}$$

Estimated Cost per City Affected=

$$(\text{City sq. mi}) \times (\text{EPA clean-up Cost per sq. mi})$$

**EPA Estimated Clean-up Cost for New York, New York:**

$$(444.3 \text{ sq mi})^{17} \times (\$250,905.6\text{M}) = \$111.5\text{T}$$

**EPA Estimated Clean-up Cost for Los Angeles, California:**

$$(498.4 \text{ sq mi})^{18} \times (\$250,905.6\text{M}) = \$125.1\text{T}$$

**EPA Estimated Clean-up Cost for Chicago, Illinois:**

$$(234.0 \text{ sq. mi.})^{19} \times (\$250,905.6\text{M}) = \$58.7\text{T}$$

**EPA Estimated Clean-up Cost for Washington, District of Columbia:**

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<sup>15</sup> Cable News Network, "Anthrax cleanup under way in Senate office building," Turner Broadcasting System, <http://edition.cnn.com/2001/HEALTH/conditions/12/01/anthrax.hart/index.html> (accessed September 22, 2012).

<sup>16</sup> Of note- 27878400 square feet is equivalent to 1 square mile

<sup>17</sup> IDcide Local Information Data Server, "New York Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/ny/new-york.htm> (accessed August 18, 2012).

<sup>18</sup> IDcide Local Information Data Server, "Los Angeles Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/ca/los-angeles.htm> (accessed August 18, 2012).

<sup>19</sup> IDcide Local Information Data Server, "Chicago Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/il/chicago.htm> (accessed August 18, 2012).

$$(68.3 \text{ sq. mi})^{20} \times (\$250,905.6\text{M}) = \$17.1\text{T}$$

**EPA Estimated Clean-up Cost for Hartford, Connecticut:**

$$(18 \text{ sq. mi})^{21} \times (\$250,905.6\text{M}) = \$4.5\text{T}$$

**Managing the Complexities Associated with Bioterrorism**

As individuals contemplate the complexities associated with potential acts of bioterrorism, it may be difficult to navigate the intricacies and anxieties connected with this type of horror: (a) Has there been some type of hazardous exposure, and how is exposure determined; (b) What exactly is this harmful agent; (c) What types of consequences does contact with this agent cause; and lastly, (d) Are the consequences of exposure or contact short-term, long-term, and possibly generational? Most individuals have general knowledge, though limited, of what toxins or agents are considered harmful to people, animals or crops. However, it is what individuals do not know about harmful toxins and agents, or the myths associated with the unknown, that pose the greatest risks and dangers.

Department of Defense officials, Health and Human Service workers, which include Centers for Disease Control personnel and National Institute of Health personnel, are faced with the same challenges, as the lay public, when they encounter potential threats of bioterrorism. These emergency responders ponder the following factors when assessing the risk of biological weaponry: (a) What is the source of this outbreak; (b) Is

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<sup>20</sup> IDcide Local Information Data Server, "DC Washington Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/dc/washington.htm> (accessed August 18, 2012).

<sup>21</sup> IDcide Local Information Data Server, "Hartford Profile," IDcide Local Information Data Server, <http://www.idcide.com/citydata/ct/hartford.htm> (accessed August 18, 2012).

the source bacterial, viral or chemical; (c) Has the source been reengineered to resist antibiotics or other known treatment options; (d) Will the illness caused by the agent be recognizable; and (e) Will the disease or illness mimic similarities to other outbreaks?<sup>22</sup>

The economic impact of a bioterrorist attack on one American city is significant, and in some ways crippling to the American way of life. Billions to trillions of dollars would be needed to address one, isolated incident. Imagine the calamity if attacks were to occur on two cities, or several cities, simultaneously?

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<sup>22</sup> U.S. Department of Health and Human Services, *Terrorism and Other Public Health Emergencies: A Reference Guide for Media* (District of Columbia: U.S. Department of Health and Human Services, 2005), 45.

## CHAPTER FIVE

### READINESS PLANNING FOR THE DANGERS POSED BY BIOTERROR

Recent changes in legislation, such as the implementation of the aforementioned *Executive Order 13546* and *Project Bioshield Act of 2004*, suggest there is awareness that biological terrorism could occur on American soil. While government officials, military personnel and civilians may have differing perspectives as to how biological attacks may be prevented, it is safe to presuppose they share this common philosophy: If prevention of attacks is impossible, the next best scenario would be to reduce potential catastrophes. Scenarios such as Dark Winter, Atlantic Storm, TOPOFF 3, and National Guard Decontamination Drills, serve to prepare individuals for what may occur, and also serve to confirm the severity of potential threats.

#### **An Analysis of Dark Winter**

Dark Winter was a war game scenario orchestrated by the Johns Hopkins Center for Civilian Biodefense Studies, the ANSER Institute for Homeland Security, the Center for Strategic and International Studies, and the Oklahoma City National Memorial Institute for the Prevention of Terrorism, to examine readiness levels for all involved in the event of biological warfare on American soil.<sup>1</sup> The biological agent used was smallpox; the targeted location was Oklahoma City. The scenario took place over thirteen days, encompassing 25 states and 15 other countries. The source of the infection was unknown, however, definitive diagnoses were made confirming positive cases of the

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<sup>1</sup> Center for Biosecurity, "Dark Winter," University of Pittsburg School of Health Sciences, [http://www.upmc-biosecurity.org/website/events/2001\\_darkwinter/](http://www.upmc-biosecurity.org/website/events/2001_darkwinter/) (accessed August 19, 2012).

smallpox disease.<sup>2</sup> Although the Dark Winter exercise was scripted, the scenario was played out to include involvement by government officials, as well as the media.

Consider the following excerpt of the President's words taken from the exercise:

This is extremely serious. As I'm sure most of you know, smallpox no longer exists in nature. As I understand it, it's just about impossible that this case—these cases, it now appears—arose either naturally or by accident. There is no smallpox virus stored anywhere near Oklahoma City. We are at this point assuming the virus was introduced deliberately, by foreign state—or non-state sponsored operatives. We are considering this a bioterrorist attack on the United States. I'm told that much of the United States is extremely susceptible to smallpox. Vaccinations were halted some thirty years ago. Those who were vaccinated before that time probably have only minimal resistance to the disease today. The same is true of much of the rest of the world. We anticipate that this news, once circulated, will cause considerable alarm, probably panic, in many places. Mostly here at first, but likely spreading abroad as well.<sup>3</sup>

Careful reflection on these words introduces a number of concepts to consider. First, the idea that a biological agent mysteriously resurfaces after being somewhat extinct brings awareness to the notion that biological agents can attack arbitrarily, and can infect individuals without their knowledge. Second, the idea that this agent is likely linked to deliberate bioterror confirms the fact that harmful biological agents can be easily created or accessed, thus, they must be closely monitored and should remain under lock and key surveillance. Third, the fact that the only possible cure, in the form of a vaccination, is available in limited quantities, because production efforts were reduced over three decades ago, establishes the need for a means to immediately prioritize the development

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<sup>2</sup> Center for Biosecurity of UPMC, "Dark Winter," University of Pittsburg School of Health Sciences, [http://www.upmc-biosecurity.org/website/events/2001\\_darkwinter/](http://www.upmc-biosecurity.org/website/events/2001_darkwinter/) (accessed August 19, 2012).

<sup>3</sup> William R. Clark, *Bracing for Armageddon?: The Science and Politics of Bioterrorism in America* (New York: Oxford University Press, 2008), chap. 1, under "Act 1. December 9, 1999. 7:00PM," Kindle ebook.

and dissemination of remedies to combat the effects of harmful biological or chemical agents, thereby, reducing the likelihood of public pandemonium. Consider the following texts from the scripts of the Deputy National Security Advisor, Secretary of Health and Human Services, and Director of FEMA respectively:

Hospitals in several cities are completely overwhelmed, partly from the increased caseloads of patients who need to be isolated, and partly from the fact that a large number of workers are refusing to enter hospitals for fear of catching the disease and passing it on to their families and friends. Isolated cases of smallpox have shown up in several foreign countries; all are traceable to one of three primary outbreak locations in the United States. Some countries are already closing their borders to U.S. goods and to U.S. citizens unless they have proof of recent vaccination. Vaccine distribution has been chaotic, and vaccine doses have been shipped from CDC are being used up at an alarming rate. Riots have broken out near some distribution centers, requiring police and National Guard troops to guarantee the safety of public health workers.<sup>4</sup>

There are not enough isolation facilities to house infected patients. Also, we are finding that many families are trying to move relatives with non-smallpox problems out of hospitals treating smallpox patients. We are seeing misinformation being passed along—presumably unintentionally—by media of all types. For example there have been several charges that people in poorer sections of the cities are not getting equal access to vaccinations.<sup>5</sup>

The National Disaster Medical System is not working particularly well in this situation. The system calls for hospitals in unaffected areas to accept overflow patients from crisis regions, but the last thing we want to do is transport active smallpox patients long distances and implant them in unaffected areas. . . . We are now seeing individual states beginning to close their borders with surrounding states. This raises some real issues with respect to the national interstate highway system and interstate commerce, which is a federal issue.<sup>6</sup>

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<sup>4</sup> William R. Clark, *Bracing for Armageddon?: The Science and Politics of Bioterrorism in America* (New York: Oxford University Press, 2008), chap. 1, under “Act II. December 15, 1PM,” Kindle ebook.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

These words convey the crux of what must be considered when formulating policy that seeks to protect the public at large in the event of biological warfare. This simulated event was used to call attention to areas likely to be challenged by such a calamity. The scenario clearly depicts myriad inconveniences and factors that severely impact everyday life for those exposed to the attack. Many operational, political and legal challenges were uncovered during this exercise. For example, it is obvious that hospitals were ill-prepared for the magnitude of patient care required to successfully manage this attack, as is evidenced by the lack of isolation quarters and personnel refusing to interact with the infected. Furthermore, the absence of a systematic approach to dispense available vaccines and manage crowd control further highlights a lack of advance emergency planning. Likewise, the lack of foresight to implement methods by which goods would be protected to minimize any economic disruption due to exporting restrictions, places unnecessary, additional strain on the economy. Moreover, the possibility that socioeconomic standing would potentially delay access to necessary medicines poses an ethical challenge to be resolved in addition to the aforementioned operational, political and legal challenges. In theory, passing legislation which addresses these concerns is ideal; however, effective policy must be proven and reengineered on a continuous basis to ensure its value.

Dark Winter was coordinated prior to the terrorist attacks on September 11, 2001. Since the homeland had not experienced this type of invasive activity before, it is understandable that much improvement would be required after the mock event.

Although the events of September 11<sup>th</sup> did not involve biological warfare, awareness of the various transferable skill-sets could allow for modification of processes for successful application to future attacks, in hopes of reducing the level of unpreparedness.

### **An Analysis of Atlantic Storm**

Atlantic Storm was another preparatory scenario orchestrated to highlight the challenges that would be faced in the event of biological warfare. This drill, organized by The Center for Biosecurity of the University of Pittsburg Medical Center, The Center for Transatlantic Relations of Johns Hopkins University and The Transatlantic Biosecurity Network, which convened on January 14, 2005 in Washington, D.C., three and one-half years after the September 11<sup>th</sup> terrorist attacks, was specifically designed to heighten awareness to the major international issues that would likely be encountered during this type of activity.<sup>7</sup> The biological weapon used during the scenario was the same as was used during Dark Winter, smallpox, however, the virus was introduced in several cities across North America and Europe. This exercise depicted that several international leaders, to include the Prime Minister of Canada, President of the European Commission, Chancellor of Germany, President of France, Prime Minister of Italy, Prime Minister of the Netherlands, Prime Minister of Poland, Prime Minister of Sweden, President of the United States, Prime Minister of the United Kingdom, and the Director General of the World Health Organization, were gathered for a conference to explore how to best handle

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<sup>7</sup> Center for Biosecurity of UPMC, "Atlantic Storm," University of Pittsburg School of Health Sciences, <http://www.atlantic-storm.org/about.html> (accessed August 19, 2012); Bradley T. Smith et al., "Navigating the Storm: Report and Recommendations from the Atlantic Storm Exercise," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no.3 (2005) <http://www.atlantic-storm.org/flash/pdf/biosecurity-article.pdf> (accessed August 19, 1012).

possible future attacks by biological weapons. At the conference, the leaders were notified that smallpox outbreaks were reported in Germany, the Netherlands, Sweden and Turkey.<sup>8</sup> Participating members were given relevant information pertaining to the crisis through media networks and individualized written bulletins from various government officials in their respective countries. The initial biological attacks were to have taken place between January 1, 2005 and January 4, 2005 in Istanbul, Frankfurt, Warsaw, Rotterdam, New York, and Los Angeles. Smallpox was the weapon of choice disseminated by way of aerosol sprayers.<sup>9</sup>

Notification of the outbreaks occurred approximately ten to fourteen days after the initial exposures to smallpox because of the common assumptions regarding the gradual development and spread of the smallpox virus.<sup>10</sup> Furthermore, as the drill continued, numbers of individuals affected by smallpox increased exponentially to allow for first and second generation cases which would result from ongoing person to person contact.<sup>11</sup> In fact, so as to educate the participating members to the potential public health impact this type of situation could impose, projections were provided which showed the number of secondary and tertiary smallpox cases that were likely to occur over the next

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<sup>8</sup> Bradley T. Smith et al., "Navigating the Storm: Report and Recommendations from the Atlantic Storm Exercise," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no.3 (2005): 257-259. <http://www.atlantic-storm.org/flash/pdf/biosecurity-article.pdf> (accessed August 19, 1012).

<sup>9</sup> Ibid., 259.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

30 days, as a result of person to person contact.<sup>12</sup> In addition to the alarming increase in the number of people to become infected with the smallpox virus, the scenario brought awareness to the available quantities of smallpox vaccinations needed to address attacks of this magnitude. As of January 14, 2005, the date of the scenario, 720 million doses of smallpox vaccination were available globally.<sup>13</sup> This figure reflected enough vaccinations for approximately 10% of the world's population.<sup>14</sup> The reality was that many countries did not have access to smallpox vaccinations, and only 9 countries had enough to effectively vaccinate their countries' population.<sup>15</sup> At the end of the mock drill, program participants discussed possible ways to improve biosecurity on an international level, and offered several recommendations to manage biological attacks. Of the recommendations offered, the following are listed for analysis:

The U.S. should work with the international community to plan for coordinated responses to major bioattacks and epidemics. Such plans should include strategic and operational detail commensurate with other major international security agreements and organizations.<sup>16</sup>

The U.S. and its allies should strengthen their own national plans to respond to biotreats and encourage other countries to do the same.<sup>17</sup>

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<sup>12</sup> Bradley T. Smith et al., "Navigating the Storm: Report and Recommendations from the Atlantic Storm Exercise," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no.3 (2005): 259.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid., 261.

<sup>17</sup> Ibid., 263.

Leaders in the U.S. and other countries need to be prepared to communicate effectively with the public during a crisis.<sup>18</sup>

The absence of available drugs, vaccines, diagnostic tests, the inadequacies of health information systems, and the lack of mass distribution systems for medicines and vaccines will limit leaders' capacities to deal with large-scale epidemics.<sup>19</sup>

The Atlantic Storm exercise unveiled a lack of coordination at the international level in regard to biosecurity. Furthermore, it brought awareness to how ill-prepared the greater international community was as it applied to effectively managing and/or preventing potential acts of bioterrorism. The suggestion that the U.S. refine its own countermeasures and collaborate with other countries to ensure a cohesive, systematic approach to emergency preparedness is both practical and necessary. Terrorism has no distinct boundary; therefore, preventative measures should be consistent, must be aggressive and above all, must be effective. As far as effective communication with the public at large, emergency personnel must convey the most accurate information, without causing unnecessary alarm, to the community. In addition, emergency responders must portray a modicum of uncertainty and panic—coupled with large amounts of compassion and assurance—so that community members comprehend the severity of the threat at hand, yet believe in the processes created to minimize ruin and potential societal collapse. As a result of improving and developing individual response plans, collaboration between countries will highlight all of the best available procedures and offer plausible strategies

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<sup>18</sup> Bradley T. Smith et al., “Navigating the Storm: Report and Recommendations from the Atlantic Storm Exercise,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no.3 (2005): 265.

<sup>19</sup> *Ibid.*

to incorporate these procedures; furthermore, strategies that have been tested and reengineered, as often as necessary, will enable the creation of effective legislation where necessary.

While the Atlantic Storm drill was exercised over three years after the Dark Winter drill, and after a real-life *Bacillus anthrax* scare event, it is surprising to report the similarities in dysfunction between the two drills; specifically, neighboring states or countries wanting to close their borders because of fear about the threat, as well as insecurity about the availability of an effective cure for the threat to serve the entire community in a timely manner.<sup>20</sup> This behavior is clearly indicative of people's fear of the unknown, individual's desire to protect self first, and signifies a level of reluctance to embrace what may likely appear as ad hoc preparedness measures, rather than well reasoned, tested solutions. Consequently, continuous efforts to educate communities about the creation and distribution of available resources and legislation, with provisions, which seeks to monitor the international situation, and allows for the injection of feasible countermeasures as often as necessary, is in order.

### **An Analysis of TOPOFF 3**

Top Officials 3, also named TOPOFF 3 and T3 FSE, was the last emergency terrorist response drill of a three-part series performed in the U.S. It consisted of both chemical and biological agents and involved over 200 agencies, national and

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<sup>20</sup> Bradley T. Smith et al., "Navigating the Storm: Report and Recommendations from the Atlantic Storm Exercise," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no.3 (2005).

international, public and private.<sup>21</sup> The drill was orchestrated April 4 through April 8, 2005, with simulated attacks occurring in the counties of Union and Middlesex New Jersey, and the city of New London Connecticut.<sup>22</sup> International drills were also scheduled to occur in conjunction with these domestic exercises in the United Kingdom and Canada; these drills were entitled ATLANTIC BLUE and TRIPLE PLAY respectively.<sup>23</sup> The scenario was as follows:

T3 FSE begins as terrorists, planning attacks in the New York and Boston metropolitan areas, suspect their plans are compromised. They react by accelerating their original schedule, deploying a vehicle-based biological agent dispersal device in New Jersey. Seriously ill patients begin to overwhelm local hospitals. As the scenario unfolds, every county in New Jersey will need a Point of Dispensing (POD) for antibiotics. Meanwhile, the chemical weapon attack originally planned for Boston is also accelerated and executed in New London, Connecticut, augmented with a vehicle-based improvised explosive device.<sup>24</sup>

TOPOFF 3 was a unique preparatory exercise because it explored reactions and responses to chemical and biological attacks occurring simultaneously nationally and internationally, by way of explosive agents mimicking car bombings. Drills of this type are necessary so that various systems, such as defense systems and emergency systems can learn from one another's strengths and improve on the weaknesses of the agencies

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<sup>21</sup> Global Security, "Homeland Security:TOPOFF3," Global Security, [http://www.globalsecurity.org/security/ops/index\\_topoff3.htm](http://www.globalsecurity.org/security/ops/index_topoff3.htm) (accessed September 19, 2012).

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

also. Additionally, these practice sessions offer opportunities to implement newly created legislation, and provide an avenue to critique and refine existing legislation in an attempt to provide a uniform emergency structure which will continually improve the public welfare.

### **Local Readiness Planning**

State and local government agencies collaborate to ensure that the homeland is as safe as possible. State National Guard response forces conduct mock drills and practice decontamination procedures routinely to review new courses of action, and explore new philosophies that may have emerged in the fight against terrorism. During mock drill sessions, military chemical specialists determine where “hot-spots”<sup>25</sup> may occur, where “fall-out zones”<sup>26</sup> would likely result, as well as what type of agent or agents would produce the observed effects. Examples of these ongoing scenarios include “dirty-bomb drills”<sup>27</sup> and hydrogen cyanide chemical drills. Additionally, RECON, Search and Rescue, and building collapse scenarios are practiced.<sup>28</sup>

Although attacks by biological and chemical agents cannot be classified as new occurrences, the myriad possibilities and methods by which these attacks can occur require that they be constantly addressed as new problems requiring new solutions.

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<sup>25</sup> Army National Guard Specialist 229<sup>th</sup> Chemical Division, interview by author, Richmond, Va, November 20, 2011. All interviews were confidential; the name of the interviewee was withheld by mutual agreement.

<sup>26</sup> Ibid.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

Terrorists are constantly creating new technologies and engaging in new activities to disrupt the American quality of life. As a result, effective policies must be overarching, yet adaptable enough to impact the ever-changing environment. Analyses of previous attacks, such as Dark Winter, as well as critical reviews of mock drills, such as Atlantic Storm, reveal that attacks by biological or chemical agents are not as conventional as attacks by traditional weapons of mass destruction. First of all, biological or chemical attacks can take affect without warning, and without the host's awareness. At the same time, because of variances in factors such as how quickly the biological agent will multiply, or how likely the chemical agent is to transfer from person to person, depending upon the toxin used, extensive lengths of time can pass before people begin to feel ill, or physical symptoms such as bleeding, convulsions, burns, boils, rashes, etc.,<sup>29</sup> present themselves, alerting individuals to potential situations or dangers. As a means of minimizing the potentially catastrophic results of biological and chemical attacks, it is imperative that federal, state and local governments work in tandem with the lay public to promote effective policies that serve to enforce a safe environment for all who wish to call America home.

### **The BioWatch Program**

What can be done to ensure the safety of the homeland when so many resources are available to those who seek to cause harm? Preparatory drills are one important aspect of readiness planning, however, they must be accompanied by proactive legislation in

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<sup>29</sup> Anthony H. Cordesman, *Terrorism, Asymmetric Warfare, and Weapons of Mass Destruction: Defending the U.S. Homeland* (Connecticut: Praeger Publishers, 2002), chap. 4, under "Table 4.8 The Effects of Iraq's Biological Weapons," Kindle ebook.

order to be effective. Since the heinous attacks of September 11<sup>th</sup>, many meaningful pieces of legislation have been introduced in hopes of reducing the threat of danger. While this is a necessary process, a more necessary process is one that allows for constant collaboration between all entities with responsibilities tied to protecting the homeland, and also requires reconsideration as often as necessary to ensure the full benefit of all available resources. One such resource is the *Bio Watch Program* which works in conjunction with the *Biological Warning and Incident Characterization System Program*. This progressive form of legislation, instituted in response to requests from local and state entities, involves the collaborative efforts of the Department of Homeland Security, the Environmental Protection Agency, The Centers for Disease Control and Protection, and The Federal Bureau of Investigation.<sup>30</sup> The purpose of this program is to serve as a monitor for the presence of harmful pathogens that may be present in the air. The system will then alert public health officials and relevant government agencies of the presence of these agents. The system operates by way of specialized aerosol sampler devices mounted on Environmental Protection Agency monitoring stations, testing and analyzing the quality of air and airborne particles passing through its filters.<sup>31</sup> Hence, the detection of potentially harmful pathogens present in the air that are likely to cause hazardous conditions in the homeland. While the complete list of pathogens for which the system monitors is not public knowledge, a partial list is available and includes harmful agents

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<sup>30</sup> Dana A. Shea and Sarah A. Lister, "The BioWatch Program: Detection of Bioterrorism," Congressional Research Service Report No. RL 32152 (November 2003), <http://www.fas.org/sgp/crs/terror/RL32152.html> (accessed September 23, 2012).

<sup>31</sup> *Ibid.*

such as *Bacillus anthrax* and smallpox.<sup>32</sup> Presently, this program has been implemented in 31 cities, with hopes of expanding to 120 in the near future.<sup>33</sup> Once it has been determined that dangerous pathogens are present in the air, the Bio Watch triggers the Biological Warning and Incident Characterization System, which serves to assess the level for which emergency public health intervention is necessary. An important aspect of this program is that it allows local agencies to customize its features to coordinate with the established emergency preparedness plans already implemented in those areas.<sup>34</sup> Readiness planning programs, similarly as with all other defense mechanisms, though necessary, are not implemented and maintained without incurring expense. Although the exact cost associated with this program is not readily available, it is reported that the cost of implementation per city is approximately \$1 million, with an annual operational budget of \$1 million per city as well.<sup>35</sup>

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<sup>32</sup> Dana A. Shea and Sarah A. Lister, “The BioWatch Program: Detection of Bioterrorism,” Congressional Research Service Report No. RL 32152 (November 2003), <http://www.fas.org/sgp/crs/terror/RL32152.html> (accessed September 23, 2012).

<sup>33</sup> Ibid.

<sup>34</sup> Department of Homeland Security, “Biological Warning and Incident Characterization,” Department of Homeland Security, [http://www.sandia.gov/mission/homeland/factsheets/archive/BWIC\\_factsheet.pdf](http://www.sandia.gov/mission/homeland/factsheets/archive/BWIC_factsheet.pdf) (accessed September 23, 2012).

<sup>35</sup> Dana A. Shea and Sarah A. Lister, “The BioWatch Program: Detection of Bioterrorism,” Congressional Research Service Report No. RL 32152 (November 2003), <http://www.fas.org/sgp/crs/terror/RL32152.html> (accessed September 23, 2012).

## **The Biological Weapons Convention Treaty**

Despite the fact that much focus has been given to the creation and implementation of new legislation that seeks to prohibit the proliferation of harmful biological and chemical agents, careful attention should be given to older pieces of legislation which can serve to be very effective in the current fight against bioterrorism. *The Biological Weapons Convention Treaty* was introduced over thirty years ago; as mentioned in an earlier part of this thesis, President Nixon pushed for this legislation in hopes of eliminating biological warfare. This treaty is available to any country for an indefinite time period.<sup>36</sup> The terms of *The Biological Weapons Convention Treaty* are still relevant today, even as Americans have become more exposed to newer methods of bioterrorism. This treaty seeks to limit the possibility of harmful biological agents reaching the public at large by completely eliminating:

The development, stockpiling, acquisition, retention, and production of biological agents and toxins ‘of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;’ weapons, equipment, and delivery vehicles ‘designed to use such agents or toxins for hostile purposes or in armed conflict.’ The transfer of or assistance with acquiring the agents, toxins, weapons, equipment, and delivery vehicles described above.<sup>37</sup>

The Biological Weapons Convention opened for signature and acceptance on April 10, 1972, after approval from the United Nations, and was enforced officially on March 26,

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<sup>36</sup> Arms Control Association, “The Biological Weapons Convention (BWC) At A Glance,” Arms Control Association, <http://www.armscontrol.org/factsheets/bwc> (accessed October 8, 2012).

<sup>37</sup> Ibid.

1975.<sup>38</sup> To date, there are 165 State Parties and 12 signatories.<sup>39</sup> In theory, membership in the convention requires compliance with the established guidelines, and offers provisions where state members can lodge complaints to the United Nations' Security Council, in the event state members fail to conform to the rules and regulations. Under the provisions of the Treaty, certain countries have veto power over the biological weapon convention investigation decisions of the Security Council.<sup>40</sup> Members of the Convention meet every five years to review the terms of the Treaty.<sup>41</sup>

Over the course of the Convention's existence, there have been violations of the rules and regulations. In fact, as recently as 2001, there have been violations of the convention's provisions by Iraq, Libya, and North Korea, and in 2002, Cuba was added to list of offenders.<sup>42</sup> The last five year review conference, which was the seventh review conference for the Convention, took place in December, 2011, and the following declaration was released: "under all circumstances the use of bacteriological (biological) and toxin weapons is effectively prohibited by the Convention and affirms the determination of States parties to condemn any use of biological agents or toxins other than for peaceful purposes, by anyone at any time."<sup>43</sup> This legislation is an excellent first

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<sup>38</sup>Ibid.

<sup>39</sup> Arms Control Association, "The Biological Weapons Convention (BWC) At A Glance," Arms Control Association, <http://www.armscontrol.org/factsheets/bwc> (accessed October 8, 2012).

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

line defense mechanism for controlling the production and unauthorized use of harmful biological and chemical agents. If participating countries agree to refrain from engaging in this prohibited activity, then the likelihood that these types of agents will be available to cause detriment to the homeland, and other nations as well, is greatly reduced. In addition, if participating countries require strict conformance to the treaty, and collectively support harsh measures for violators, the number of offenders would also be greatly reduced. Furthermore, if breaches in the treaty's provisions were taken as matters of national and international security, with the full backing of the United Nations for those who dare to violate the terms of the agreement, perhaps fewer countries would engage in blatant disregard for the Convention. While it is important to state the rules and voice requirements, it is equally as important to enforce the standard, and require adherence. Incidentally, enforcing the standard has little to do with intimidation and vengeance, and more to do with projecting the seriousness of the Convention's commitment to counterbioterrorism. Once this first line of defense is secure, monitoring the second lines of defense will prove to be much easier. Newly created legislation, such as the *Project Bioshield Act of 2004*, *Executive Order 13546*, and *Sections 2332a and 175 of Title 18 US Code*, all serve to complement this older piece of legislation, and if used in conjunction with, will only seek to enhance the development of bioterrorism strategies.

## **CHAPTER SIX**

### **THE THREAT OF BIOTERRORISM SHAPES AMERICAN CULTURE**

An important element of this thesis is analyzing whether Americans have conceptualized the ramifications that acts of bioterrorism would have on the culture. Culture of course, is being considered in the broadest context possible; a means of identifying with and exploring individuals' customs, ideas, beliefs, values and attitudes about everything. When individuals consider how potential acts of bioterrorism would impact their lifestyles, admittedly enough, the concept appears quite daunting. This notion is not given to cause feelings of extreme fear or helplessness, but rather to encourage concern and a degree of healthy dialogue, where appropriate, about the safety and protection of the homeland. Furthermore, as responsible inhabitants of the homeland, would it not be in the best interest of all concerned to repeatedly explore and improve upon existing methods which seek to maintain and preserve resources, whether social, political or economic?

#### **Bioterrorism Legislation/Protocols May Limit Personal Freedoms**

As individuals embrace the concept of existing in an environment which engages in countermeasures to protect its borders from the dangers of biological or chemical attacks, they will probably reflect on the limits to personal freedoms that such practices create. Security measures and procedures, as well as legislation which were originally created to protect the homeland, will likely now be thought of as invasive, offensive and intrusive. As with any other life-altering event, the reaction to terrorist activity will cause some degree of shift in the normal order of things. If the nation is at risk for war, and

individuals expect the government to get a handle on situations that compromise the well-being of the homeland, there will likely be some restriction in personal freedoms for the sake of security. However, the expectation of every citizen should be that the government maintain a balance between lawful and necessary, as it applies to enforcing boundaries. Certainly the writers of the Constitution knew that in order to protect liberties, there must be some strong defense measures taken against the enemy; however, there must be a reasonable extent to which forceful measures must extend. It has become increasingly difficult to refute the ideology that terrorist activity has significantly impacted the tone of American culture. In as much as life in general has changed since terrorist activity hit American shores, the quality of life individuals have come to expect is different also. For example, the Constitution offered citizens the opportunity to hold their government accountable and promised transparency in operation; however, since the confirmed terrorist activity of September 11<sup>th</sup>, and the ongoing threat of acts of terrorism by any means, legislation which uniquely contradicts the Constitution has been adopted and considered legal.<sup>1</sup>

Over the course of many years, individuals have relied on the proficiency of the government to ensure the safety of new drugs and technologies for public use. In fact, individuals have come to expect the Food and Drug Administration to guarantee the

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<sup>1</sup> The Uniting And Strengthening America By Providing Appropriate Tools Required To Intercept And Obstruct Terrorism (USA PATRIOT ACT) Act of 2001, Public Law 107-56, 107<sup>th</sup> Cong., *U.S. Statutes at Large* 115 (2001). Excerpts for The USA Patriot Act reveal the government's authority to intercept wire, oral, and electronic communications relating to terrorism, authority to intercept wire, oral, and electronic communications relating to computer fraud and abuse offenses, authority for delaying notice of the execution of a warrant, etc. These practices significantly manipulate and misrepresent specific amendments to the Constitution.

safety of products before consumers are exposed or introduced to them. The threat of bioterrorism has caused a change in this once trusted method. Legislation now allows for emergency production and mass distribution of medicines and/or vaccinations, without following the necessary guidelines or waiting periods of approval, when needed to respond to biological attacks.<sup>2</sup>

Delving deeper into a scenario presented in an earlier portion of this thesis, unveils the potential for ethical debacles resulting from restrictions that proactive protective measures may create. During the Dark Winter drill, reference was made to hospital patient caseloads being overwhelmingly high because patient isolation needs increased, and many hospital workers refused to report to work because they feared catching disease—being affected by it—and potentially passing it on to family members. Also of concern were hospitals in unaffected areas rejecting overflow patients from affected areas, and members of certain communities being denied access to vaccines. Members of the healthcare community are considered to be essential personnel, just as military personnel are. Healthcare workers who choose to neglect their duties or obligations to serve, are as much in violation of their commitments to protect and serve, and vows to do no harm, as police officers or military personnel who refuse to engage in potentially dangerous situations. While these workers have a right to exercise their civil liberties, in the vein that they are allowed to choose whether to report or not without being forced, their choices must not prevent other patients from receiving quality care. Refusing to report to work in these types of situations creates precarious situations,

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<sup>2</sup> Project Bioshield Act of 2004, Public Law 108-276, 108<sup>th</sup> Cong, *U.S. Statutes at Large* 118 (2004):842-852.

mainly because emergency responders are expected to provide life-saving services as often as needed, regardless of the risks associated with the delivery of services. As for the matter of hospitals refusing to accept affected patients, outside of a mandatory quarantine mandate to ensure containment of the outbreak, hospitals ought not to be allowed to deny treatment to patients. Only when quarantine is deemed necessary, by order of local, state or federal level authorities are hospitals able to deny admittance. Denying vaccines or limiting the availability of life-saving treatment based on location or socioeconomic standing is unequivocally immoral. In fact, the three occurrences mentioned in this scenario are clear breaches of the ethical principle of distributive justice. Refusing or limiting individuals' equitable access to the most basic healthcare necessary violates society's moral obligation to provide equal access to all available resources to all those in need.

The manner by which individuals live their lives, as well as the level of control individuals have allowed the government to exercise over their lives, has changed significantly since the injection of acts of terrorism into American culture. Moreover the expectation of economic acumen and resiliency from their government, despite the obvious increase in monies needed to manage a war abroad and protect at home, have contributed to an even greater sense of disappointment for citizens. For instance, as mentioned in a previous section of this thesis, one countermeasure program cost approximately \$ 1 million to implement and another \$ 1 million to maintain per city, annually. Although this expenditure was only an estimate, it was reflective of only one defense mechanism. As far as calculating the monies needed to maintain the number of

present counterterrorism programs, individuals must not only consider the obvious costs associated with counterterrorism programs, such as the cost of equipment, monitoring devices, vaccinations, etc., but also factor in the hidden expenses, such as training of emergency personnel and the required capital to run practice drills to ensure that all personnel are able to operate effectively, when there are real attacks. These expenditures affect the overall economic health of the nation, as some citizens may strongly believe that these expenses are compulsory, while others feel that they are optional, offering conflicting views about how government resources are allocated. How do these exorbitant outlays of capital, and feelings of uncertainty, impact the average citizen seeking protection from acts of bioterrorism? What are the shared feelings about the threat of acts of bioterrorism on American soil?

### **Community Survey Results and Analysis**

A survey of 100 people, small by research standards, was conducted over the course of three days to determine how individuals felt about bioterrorism and its threat to American culture. The details of the survey and the results are reported as follows:

A simple random sample survey of 100 individuals from the communities of Chester, Dinwiddie and Richmond, Virginia was conducted to assess the general opinions of community members in regard to the challenges that bioterrorist activities may place on individuals and their communities. Individuals volunteered to complete a questionnaire containing five questions, agreed to answer the questions without collaborating with others, and were instructed to place the completed questionnaires in the slot of the marked box. At the end of the survey process it was determined that of the 100 available

questionnaires to be completed, only 87 completed questionnaires were placed in the marked box.

Question 1 asked, do you believe that the U.S. is at risk for an attack by biological agents (biological agents are agents such as smallpox or anthrax)? Polling the public revealed that 52% of the population sample believes that America is at risk for attacks by biological agents, 35% believes that America is not at risk for attacks by biological agents, and 13% gave no opinion as to whether America was at risk for attacks by biological agents.

Question 2 asked, as a result of the terrorist activity on September 11, 2001, Congress implemented different laws that serve to protect America from terrorists and potential terrorist attacks. Do you feel safer today as a result of these pieces of legislation? Polling the public revealed that 41% of the population sample believes that they are safer today as a result of anti-terrorism or counterterrorism policy, 46% believes that these types of legislation have no effect on their safety, and 13% gave no opinion as to whether their safety was affected by anti-terrorism or counterterrorism policy.

Question 3 asked, if culture is considered in the broadest context possible, which is identifying with and exploring individuals' customs, ideas, beliefs, values and attitudes about everything, do you believe that the threat of biological attacks on American soil impacts the tone of America society? Polling the public revealed that 62% of the population sample believes that the threat of bioterrorism on American soil has an impact on society, 19% believes that the threat of bioterrorism on American soil has no impact

on society, and 19% had no opinion as to whether the threat of bioterrorism on American soil had an impact on society.

Question 4 asked, if your city was to be attacked by a biological agent within the next thirty days, do you have confidence that your community hospital and emergency responders would be able to diagnose and treat you, your family and friends, effectively? Polling the public revealed that 58% of the population sample believes that hospitals and emergency personnel would be able to diagnose and treat individuals effectively in the event of a biological attack, 29% believes that hospitals and emergency personnel would not be able to diagnose and treat individuals in the event of a biological attack, and 13% had no opinion as to whether hospitals or emergency personnel would be able to effectively diagnose and treat individuals if there was a biological attack.

Question 5 asked, which of these choices, fear of death, loss of employment, or economic devastation, is your greatest concern in regard to the threat of bioterrorism on American soil? Polling the public revealed that 67% of the population sample believes that fear of death is their greatest concern when it comes to acts of bioterrorism on American soil, 17% believes that economic devastation is their greatest concern in regard to acts of bioterrorism on American soil, 2% believes that loss of employment is their greatest concern when considering the impact of acts of bioterrorism on American soil, and 14% had no opinion as to which of these factors is of the greatest concern when conceptualizing the impact of acts of bioterrorism on American soil.

If the opinions of those who took this survey are a reflection of the greater population at large, then it is fair to presume that most individuals believe that attacks by

biological agents are highly likely. However, if the number of individuals who failed to give an opinion is considered with the number of individuals who believe there is no risk of attacks, the percentage of those who do not feel there is a threat of danger greatly increases, making the ratio of people who believe they are at risk, and those who believe there is no risk, nearly equal. Of note, when those who did not offer an opinion are added to the group of those who do not believe there is a risk, data reveals that while the percentage is increased, the majority of the population still believes that they are at risk of attacks by biological agents. Table 1, created by author, summarizes the participants' responses to the survey.

Results Of Survey									
Not Feeling Safe	0.46	At Risk of Bioterrorism Attack and Not Feeling Safe	0.11	Not Feeling Safe Given At Risk Of Bioterrorism	0.21	Not At Risk of Bioterrorism Attack and Not Feeling Safe	0.35	Not Feeling Safe Given Not At Risk Of Bioterrorism	1.00
Feeling Safe	0.41	At Risk of Bioterrorism Attack and Feeling Safe	0.41	Feeling Safe Given At Risk of Bioterrorism	0.79	Not At Risk of Bioterrorism Attack and Feeling Safe	0.00	Feeling Safe Given Not At Risk of Bioterrorism	0.00
Fearing Death	0.67	At Risk of Bioterrorism Attack and Fearing Death	0.35	Fearing Death Given At risk Of Bioterrorism Attack	0.67	Not At Risk of Bioterrorism Attack and Fearing Death	0.32	Fearing Death Given Not At risk Of Bioterrorism Attack	0.91
Not Fearing Death	0.33	At Risk of Bioterrorism Attack and Not Fearing Death	0.17	Not Fearing Death Given At Risk of Bioterrorism Attack	0.33	Not At Risk of Bioterrorism Attack and Not Fearing Death	0.03	Not Fearing Death Given Not At Risk of Bioterrorism Attack	0.09
Confidence In First Responders	0.58	At Risk of Bioterrorism Attack and Confidence In First Responders	0.3	Confidence In First Responders Given At Risk of Bioterrorism Attack	0.58	Not At Risk of Bioterrorism Attack and Confidence In First Responders	0.28	Confidence In First Responders Given Not At Risk of Bioterrorism Attack	0.80
No Confidence In First Responders	0.29	At Risk of Bioterrorism Attack and No Confidence in First Responders	0.22	No Confidence In First Responders Given At Risk of Bioterrorism Attack	0.42	Not At Risk of Bioterrorism Attack and No Confidence in First Responders	0.07	No Confidence In First Responders Given Not At Risk of Bioterrorism Attack	0.20
Effect On Culture	0.62	At Risk of Bioterrorism Attack and Effect On Culture	0.48	Effect On Culture Given At Risk Of Bioterrorism Attack	0.92	Not At Risk of Bioterrorism Attack and Effect On Culture	0.13	Effect On Culture Given Not At Risk Of Bioterrorism Attack	0.37
No Effect On Culture	0.19	At Risk of Bioterrorism Attack and No Effect On Culture	0.04	No Effect On Culture Given At Risk Of Bioterrorism Attack	0.08	Not At Risk of Bioterrorism Attack and No Effect On Culture	0.22	No Effect On Culture Given Not At Risk Of Bioterrorism Attack	0.63
At Risk of Bioterrorism Attack	0.52								
Not At Risk Of Bioterrorism Attack	0.35								

Table 1, by author: Results of Community Survey Assessing Whether Individuals Believe They Are at Risk of a Bioterrorist Attack

The probability of the responses was calculated accordingly:

$P(\text{Feeling Safe}) = P(S)$   
 $P(\text{Not Feeling Safe}) = P(\sim S)$   
 $P(\text{Worried About Death}) = P(D)$   
 $P(\text{Not Worried About Death}) = P(\sim D)$   
 $P(\text{Confident in Emergency Responses}) = P(C)$   
 $P(\text{Not Confident in Emergency Responses}) = P(\sim C)$   
 $P(\text{Effect on Culture}) = P(E)$   
 $P(\text{No Effect on Culture}) = P(\sim E)$   
 $P(\text{At Risk of Biological Attack}) = P(R)$   
 $P(\text{Not at Risk of Biological Risk}) = P(\sim R)$

$P(S|R) = P(R \text{ and } S)/P(R) = .41/.52 = .79$   
 $P(\sim S|R) = P(R \text{ and } \sim S)/P(R) = .11/.52 = .21$   
 $P(D|R) = P(R \text{ and } D)/P(R) = .35/.52 = .67$   
 $P(\sim D|R) = P(R \text{ and } \sim D)/P(R) = .17/.52 = .33$   
 $P(C|R) = P(R \text{ and } C)/P(R) = .30/.52 = .58$   
 $P(\sim C|R) = P(R \text{ and } \sim C)/P(R) = .22/.52 = .42$   
 $P(E|R) = P(R \text{ and } E)/P(R) = .48/.52 = .92$   
 $P(\sim E|R) = P(R \text{ and } \sim E)/P(R) = .04/.52 = .08$   
 $P(S|\sim R) = P(\sim R \text{ and } S)/P(\sim R) = .0/.35 = .0$   
 $P(\sim S|\sim R) = P(\sim R \text{ and } \sim S)/P(\sim R) = .35/.35 = 1$

The results of the survey indicate that individuals believe that America is at risk for an attack by biological agents. Further analysis of the available data reveals the probability of feeling safe to be 79%, the probability of being concerned about death to be 67%, the probability of confidence in emergency response to be 58%, and the probability that the threat of bioterrorism affects culture to be 92%. Consequently, the probability of not feeling safe is 21%, the probability of not being concerned about death is 33%, the probability of having no confidence in emergency response is 42%, and the probability that the threat of bioterrorism has no impact on culture is 8%.

Interestingly enough, the data reveals that the probability of feeling safe, given that we are not at risk of a biological attack is 0%. Therefore, the probability of feeling unsafe, given that we are not at risk of a biological attack is 100%. Surprisingly, even though 35% of the population sample feels as though America is not at risk of a biological attack, 100% of the polled population feels unsafe in some way.

In a study performed by the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, it was determined that “the odds that terrorist will soon strike a major city with weapons of mass destruction are better than even.”<sup>3</sup> The report went on to state that “in our judgment, America’s margin of safety is shrinking, not growing.”<sup>4</sup> In order to show that the probability of an attack by biological agents is better than even, and that the safety margin of America is shrinking the following facts must be taken into consideration. The first documented, successful biological attack on American soil was in 1984 by the Rajneeshees group in Oregon. The second documented, successful biological attack on American soil was seventeen years later, the Anthrax attacks of 2001. In order to show the probability of having at least one successful biological attack, within the next seventeen years, and since there are only two possible outcomes (success or failure) the Binomial Probability Distribution must be

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<sup>3</sup> Joby Warrick, “Nuclear or Biological Attack Called Likely,” *The Washington Post*, December 2, 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/12/01/AR2008120102710.html> (accessed October 8, 2012).

<sup>4</sup> Ibid.

applied. According to the Binomial Probability Distribution<sup>5</sup>, the probability of exactly “x” successes on “n” trials is given by the binomial formula  $P(x) = {}^n C_x p^x q^{n-x}$  where:

n= total number of years attempted  
 p= probability of success  
 q= 1-p= probability of failure  
 x= total number of successes in n years  
 n-x= number of failures in n years

With the average number of bioterrorism attacks in the U.S. being 2 for 17 years, and the probability of having a successful attack being better than even (0.5 or better), then n=17, p=0.5, q=1-0.5=0.5, and solving for  $x \geq 1$  by substitution, taking into consideration that all probabilities in an event must equal 1;

$$\begin{aligned} P(x \geq 1) &= 1 - P(x \leq 1) \\ &= 1 - [({}^{17}C_0)(0.5)^0(0.5)^{17} + ({}^{17}C_1)(0.5)^1(0.5)^{16}] \\ &= 1 - [.0000076 + .000129] \\ &= 1 - .0001366 = .99986 \end{aligned}$$

Therefore, according to the Binomial Probability Distribution, the likelihood of having at least one successful biological attack within seventeen years from 2001 in the U.S. is 99.99% Figure 1, created by author, shows a graph depicting the Binomial Probability Distribution for the data provided.

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<sup>5</sup> Robert A. Donnelly, Jr., *The Complete Idiots Guide to Statistics* (New York: Penguin Group, 2007), 122-127; Mario F. Triola, *Elementary Statistics*, ed. Craig Bartholomew and Cici Oremland (New York: The Benjamin/Cummings Publishing Company, Inc., 1986), 173-183.



Figure 1, by author: Probability of Successful Bioterrorist Attack Within 17 years

This percentage shows that at even, the probability of having at least one successful biological attack is high. Nevertheless, the statement made by the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, was that the odds were better than even. Therefore, to prove the better than even theory, the probability of the number of occurrences in an interval must be evaluated. In order to determine the probability of the number of occurrences in an interval, the Poisson Probability Distribution<sup>6</sup> will be applied. The probability distribution states:

$$P(x) = \frac{\lambda^x e^{-\lambda}}{x!}$$
 where  $\lambda$  is the mean number of occurrences in the interval and the value of  $e$  is approximately 2.71878. The average number of successful biological attacks on the U.S. is 2 in 17 years, so  $\lambda = 2$ . Now  $x \geq 1$  is the number of successful attacks that can occur within 17 years. The probability by using the Poisson formula is:

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<sup>6</sup>Robert A. Donnelly, Jr., *The Complete Idiots Guide to Statistics* (New York: Penguin Group, 2007), 131-139.

$$\begin{aligned}
P(x \geq 1) &= 1 - P(x \leq 1) \\
&= 1 - [(2^0 e^{-2})/0! + (2^1 e^{-2})/1!] \\
&= 1 - [.1353 + .2706] \\
&= 1 - .4059 = .5941
\end{aligned}$$

The Poisson Distribution shows 59.41% chance that a biological attack within seventeen years is better than even odds. Figure 2, created by author, shows a graph depicting the Poisson Distribution for the data provided.

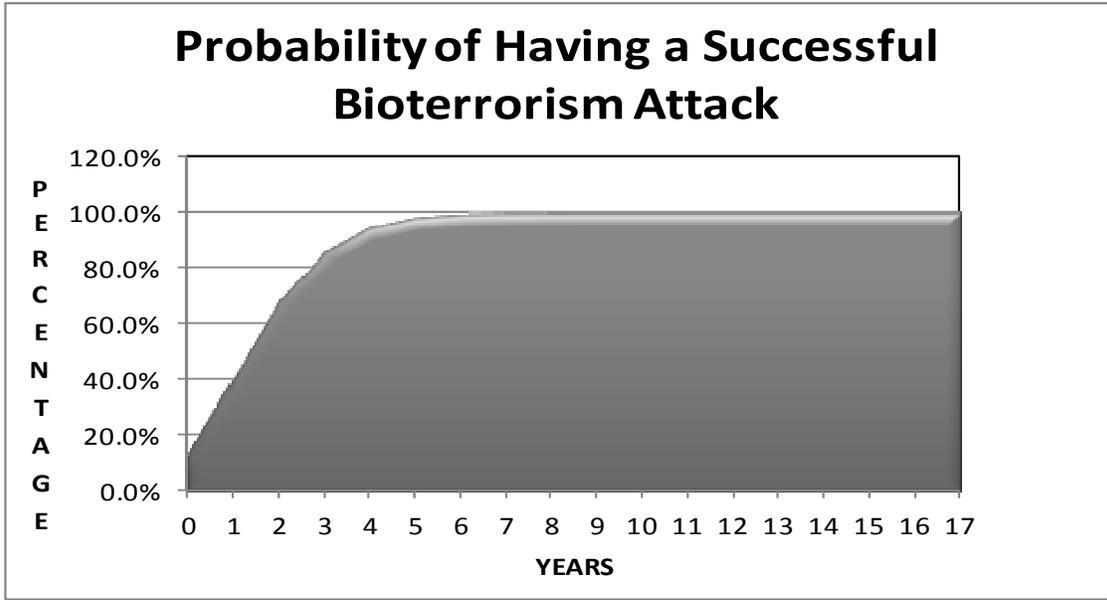


Figure 2, by author: Probability of Having a Successful Bioterrorism Attack Within 17 years

## CONCLUSION

The very thought of war on American soil seems impossible. Yet, it has occurred and continues to pose significant threat to citizens, and other inhabitants of the U.S. Analysis of the community survey revealed that most individuals believe that the U.S. is at risk for a bioterrorist attack, and they also recognize that the threat of bioterrorism impacts various facets of their existence, in a variety of ways. Also, while more than half of the survey participants reported that they felt safe generally in terms of legislation and response to the threat of bioterrorism, survey results indicated that those participants who reported feeling unsafe and who did not feel secure in legislation, still had confidence in emergency responders to assess and address potentially harmful threats. This revelation clearly confirms the urgent need to enact legislation which allows emergency preparedness to be reengineered, as often as necessary, on the community level, to increase awareness of potential threats. In a hearing, discussing the threat of bioterrorism in America, of the House of Representatives Committee on Commerce, Subcommittee on Oversight and Investigations, which occurred in May of 1999, Chairman Fred Upton acknowledged that better legislation is needed to protect individuals from bioterrorist type harm. He stated, “. . . we need to consider reasonable safety measures to further enhance our competence in the safety and security of dangerous biological agents. While we should not act in a manner that discourages legitimate and necessary scientific research into these organisms, the public policy history in this area has been one of

reaction to bad events, rather than proactive thinking.”<sup>1</sup> In the same session, Robert Burnham, Chief of the Domestic Terrorism Section of the Federal Bureau of Investigation spoke in regard to his experiences with increased, harmful uses of biological and chemical agents. His testimony was as follows:

Intelligence has indicated that terrorist groups, both foreign and domestic, have demonstrated an interest in acquiring biological materials and knowledge. Whether the cases involve mere threats or actual possession of biological material, the disruption and potential damage to the public is potentially devastating. New legislation is needed to adequately support the agents and prosecutors who work to protect the public from those who would misuse biological agents as a weapon, and those who capitalize on the fear and panic that can be derived from the mere threat of a biological attack.<sup>2</sup>

The sentiments of Chairman Fred Upton and Robert Burnham are still relevant today, thirteen years later, even though they were offered before the terrorist activity of September 11<sup>th</sup>, and prior to the anthrax letters of 2001. Scroll forward to 2012 where one can recognize that the same opinions are being offered for consideration after the fact. Although opinions differ about the severity of the threat for attacks of bioterrorism, and scholars have opposing views as to the degree of risk that biological agents pose to America’s safety, the fact still remains that acts of bioterrorism can cause, and do cause, great disruption to the quality of life which the American dream promises, and which

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<sup>1</sup> House Committee on Commerce, *The Threat of Bioterrorism in America: Assessing the Adequacy of the Federal Law Relating to Dangerous Biological Agents: Hearing before the Subcommittee on Oversight and Investigations*. 106<sup>th</sup> Cong., 1<sup>st</sup> sess., May 20, 1999: 2

<sup>2</sup> *Ibid.*, 20.

individuals have come to expect from the world's greatest superpower. Some scholars believe that catastrophic bioterrorism is unlikely; they are inclined to believe that small attacks where only hundreds, rather than thousands experience injury are acceptable. Nonetheless, catastrophe is relative to the individuals affected by the event; those counted in the hundreds would be inclined to believe that the attack was of catastrophic proportion. Furthermore, what are the criteria for substantiating catastrophic bioterrorist events? Certainly estimates that suggest public health and economic impact ranging from \$596.05M to \$2.4T, and numbers of casualties ranging between 195,008 and 650,027 would qualify as catastrophic. Would the U.S recover from the economic and public health impacts of any of these attacks? Estimated clean-up costs to address one of these incidents, which range from \$250M to \$125T, certainly would place significant burden on the economy, causing communities to feel the trickle down effects. Whether one attack is imminent, or many attacks are probable, legislation must ultimately seek to prevent, and thereby reduce the number of possible opportunities for biological or chemical agents to be used to harm the homeland. Prior to September 11, 2001, perhaps individuals thought that professed threats against America were superficial, or, that this country was impervious to terrorist attacks on its soil; however, after the events and accounts of that day, misconceptions and fallacies about the threat and risks of warfare, should have been replaced with sincere desire to protect the homeland.

Channeling the drive of heartfelt desire advantageously means the push toward effective legislation which allows for ongoing oversight and revision in order to transcend time. In order to stay abreast of changes in societal needs and circumstances

regarding terrorist and terrorist groups, in-depth, insistent quarterly evaluations of the international situation would be necessary. If the probability of at least one biological attack occurring within a seventeen year period from 2001, is 59.41%, and the goal of counterterrorism policy is to prevent attacks, or at least reduce the probability of successful attacks, then policies must be evaluated often to meet the ebbs and flows of the bioterrorist threats. It is apparent that the Office of the President, as well as Congress have engaged in authorizing and passing legislation that oppose terrorist type activities of various kinds; however, perhaps a more concerted effort by a specialized taskforce, a partnership between the National Biodefense Science Board, House of Representatives Committee on Commerce Subcommittee on Oversight and Investigations , and Department of Defense, would serve to ensure more aggressive oversight and revision of bioterrorism policy. This taskforce would be charged with gauging the existence of new biological and chemical threats, and developing new methods of averting these threats. One recommendation of this proposed taskforce could be to make better use of technologies and resources which have already been approved for use. For example, recommending national implementation of the aforementioned MedKit Prototype Program and BioWatch Program, and authorizing emergency biopreparedness drills to be performed at the community level to ensure the effectiveness of these programs. Expanding the MedKit to include a variety of antibiotics, not just anthrax treatment medicine, to be used in the event of attacks by other biological agents, would be of paramount importance in order to remain proactive in reducing person to person transference. Also, it would be in the best interest of the taskforce to establish a means to

determine where the nation stood collectively in terms of bioterrorism preparedness. Establishing measurable goals would offer a way to determine whether legislation was effective or ineffective in reducing bioterrorist type activity. How else is it determined if legislation is effective—waiting for an attack?

A means of the taskforce enforcing legislation, at the community level, in a proactive manner could be to have community readiness plans which ensure that necessary supplies, which include vaccines, are available to the entire community within 24-72 hours of being notified of outbreaks, or potential outbreaks. Furthermore, the community would work with the taskforce to establish the necessary protocols to prevent violence and aggressive behaviors at distribution locations, like those depicted in the Dark Winter scenario. Lastly, the taskforce would serve as the regulatory force to ensure the effective communication to engage the resources, if needed, promised in *Executive Order 13527*.

Undoubtedly, many challenges face the nation as it seeks to protect and serve all concerned. While government officials create and revise policies, and health care organizations, private and public, in tandem with military personnel perform mock drills to prepare for potential disaster, a significant amount of the American public still remain disconnected and disillusioned about the gravity of bioterrorism. Outside of the obvious effects, casualties and/or fatalities from the biological or chemical agent used during the terrorist attack, the very infusion of mass hysteria and panic that would infiltrate cities and towns, coupled with the limits to personal freedoms, would be incapacitating. Additionally, of course, the potential destruction would not automatically cease to exist at

the borders of the U.S., for the public health impact would be notable if vaccinations or stockpiled drugs were unavailable, and the loss of revenue from other countries resulting from disruption in exports and imports, would also cause substantial economic interference to the GDP.

While the expectation is that countermeasures will prevent potential harm, the reality is that the number of possible avenues and methods of harm—which in this case are the innumerable combinations of hazardous biological and chemical agents available to cause attacks—are countless, and the resources available to prevent all of these attacks—which in this case are the available countermeasure policies and the emergency preparedness exercises—are limited; therefore, it stands to reason that the government alone will not be able to prevent all attacks, although they are able to increase the quantities and types of countermeasures. At best, these countermeasures would serve as an avenue of reducing the number of potential successful attacks, and degree of calamity. A proactive approach to effective bioterrorism policy must seek to promote strategies which avert bioterrorist activity and must encompass the entire community at large.

A well known engineer and statistician, William Edwards Deming, noted for his work, mainly in Japan, and with Ford Motor Company in the 1980's, for improving quality by utilizing the Deming 14 Points of Management Philosophy, has a unique, yet practical philosophy which can be applied and utilized as a means of improving U.S. bioterrorism countermeasure policies. His approach, which is definitely of a proactive nature, purports this ideology, "long term commitment to new learning and new philosophy is required of any management that seeks transformation. The timid and the

fainthearted, and the people that expect quick results, are doomed to disappointment.”<sup>3</sup>

Deming had 14 key principles for effective management. Of the 14, these five are of the most benefit to bioterrorism countermeasure policy:

(1) Create constancy of purpose toward improvement of a product and service; (2) Adopt new philosophy—we can no longer live with commonly accepted levels of delay, mistakes, defective materials, and defective workmanship; (3) Institute modern methods of training on the job; (4) Drive out fear so that everyone may work effectively for the company; and (5) Institute a vigorous program of education and retraining.<sup>4</sup>

When the theories of Deming are considered in partnership with the philosophy of improving U.S. bioterrorism countermeasure policy, it becomes very apparent that long term commitment to providing a safe homeland, requires a commitment to learning new methods, which seek to enforce the safety of American borders. In addition, willingness to engage in new emergency preparedness exercises to master the benefits of new legislation, and assess the effectiveness of proposed legislation, as often as necessary, to adapt to an ever-changing environment, is needed. If transformation is to occur in an attempt to offer the most protection available to the inhabitants of the homeland, and reduce the threat of bioterrorist acts, a collective commitment to continuous improvement is necessary in order to see steady, lasting, long-term progress. Furthermore, if the aforementioned five Deming principles are applied to bioterrorism countermeasure policy development, legislation which is the most efficacious will seek to ensure steadiness of

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<sup>3</sup> Vector Study, “William Edwards Deming: Management Gurus,” Vector Study, [http://www.vectorstudy.com/management\\_gurus/edwards\\_deming.htm](http://www.vectorstudy.com/management_gurus/edwards_deming.htm) (accessed October 8, 2012).

<sup>4</sup> Ibid.

purpose toward improved countermeasure creation and implementation. Valuable legislation will serve to denounce the status quo and implement needed changes to ensure that the most advanced technologies are available for use in order to limit social disruption, economic interference, casualties and fatalities, in the event of a bioterrorist attack. The principle of driving out fear will require the defense community at large, which is inclusive of policymakers, military personnel, emergency medical responders and community members, to commit to engaging in ongoing practice efforts to ensure mastery of their contributory crafts, thereby reducing the levels of uncertainty, unfamiliarity, and insecurity, which likely contribute to feelings of fear.

Promoting effective countermeasures to prevent harmful biological attacks enhances the quality of life and protects against the loss of life, while only focusing on rebuilding efforts after an attack simply repairs the physical aftermath of the event, and does little to improve the nation's level of security, or relieve the apprehension likely to be felt by society's members. If risk is proportional to the degree of protection, then it makes sense that heightened protective measures means decreased risk. It then stands to reason that the existence of this inverse proportion is what must fuel the persistency to drive the revamping and reengineering of terrorism policy, as often as necessary, to ensure its effectiveness and efficacy. This thesis author challenges policymakers to embrace the words, attributed to Charles Darwin, in their quest to implement legislation, "it is not the strongest of the species that survives, nor the most intelligent, but the one

most responsive to change.”<sup>5</sup> Bioterrorism policy must be adaptable to change in order to remain effective.

As conscientious citizens, there must be a shared level of responsibility as far as reducing the threat of bioterrorism is concerned. Bioterrorism vigilance must encompass each and every citizen taking precautions that serve to protect themselves, as well as the homeland from potential harm. Just as Congress passes legislation with hopes of reducing bioterrorism and its associated threats, and state and local agencies encourage various emergency drills to prepare for dangerous situations, and the like, citizens must forge symbiotic relationships, between all levels of government and the community—to include emergency personnel—to better prepare countermeasures that foil biological and chemical threats. All who call America home, and all who benefit from its resources, must rise to the occasion and accept the challenge to work collaboratively and diligently in reducing the threat of bioterrorism in the homeland.

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<sup>5</sup> Goodreads, “Charles Darwin Quotes,” Goodreads, [http://www.goodreads.com/author/quotes/12793.Charles\\_Darwin](http://www.goodreads.com/author/quotes/12793.Charles_Darwin) (accessed October 10, 2012).

## **APPENDIX**

### **Statement of Human Values**

Moral issues associated with the threat of bioterrorism on American soil may have long term effects, perhaps even generational consequences, which can change the foundation of American society. Implementing and enforcing legislation that serves to eliminate heinous acts that only wish to disrupt the American way of life, or the quality of life in general, as we know it, may seem necessary; however, therein is the conflict between necessity and the dictates of morality. As a civilized nation professing to be indivisible, with promises of liberty and justice for all, should we continue to render evil acts for evil actions? While it is necessary to have laws that seek to maintain safe environments for citizens, and policies which aim to promote civility, equality and unity, legislation which implores governments and individuals to act ethically in all situations, despite personal interests, is one of the most basic concerns of human values. Legislation which seeks to engage our adversaries on non-combative levels, although we possess superior military acumen and artillery power, and encourages strict adherence to an ethical position, is at the very core of human values. As individuals who have fully evolved cerebral cortices and abilities to reason beyond that of all other animal species, the responsibility of being initiators of peace and citizens of universal solidarity should consume our existence, and supersede the practice of retaliating to acts of hatred, regardless of the seemingly justifiable reasons. It is this practice of altruism which is truly an act of valor and a testament to human values.

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