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Report to Congressional Requesters

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COMBATING TERRORISM

Need for Comprehensive Threat and Risk Assessments of Chemical and Biological Attacks

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National Security and
International Affairs Division

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The Honorable Arlen Specter
Chairman
The Honorable John D. Rockefeller IV
Ranking Minority Member
Committee on Veterans' Affairs
United States Senate

The Honorable Ike Skelton
Ranking Minority Member
Committee on Armed Services
House of Representatives

The Honorable Christopher Shays
Chairman
Subcommittee on National Security, Veterans' Affairs, and
International Relations
Committee on Government Reform
House of Representatives

As you know, many conflicting statements have been made in public testimony before Congress and in the press concerning the ease or difficulty with which terrorists could effectively disseminate a chemical or biological agent on U.S. soil and cause mass casualties. Nevertheless, numerous federal agencies are spending billions of dollars to prepare for the possibility of a terrorist attack with chemical or biological weapons. The President's fiscal year 2000 budget proposes $10 billion[1] for counterterrorism programs—an increase of more than $3 billion over the requested funding of $6.7 billion for fiscal year 1999. Some agencies have experienced rapid increases in funding for programs and activities to combat terrorism in recent years. For example, the Department of Health and Human Services (DHHS) increased its spending from $7 million in fiscal year 1996 to about $160 million in fiscal year 1999 and has requested $230 million for fiscal year 2000 for its bioterrorism initiative. As part of the same initiative, the Centers for Disease Control and Prevention (CDC), an

[1]Of the $10 billion, $8.6 billion is for combating terrorism, including defending against weapons of mass destruction, and $1.4 billion is for critical infrastructure protection.

operating division within DHHS, will continue to develop the national pharmaceutical stockpile to prepare for terrorist incidents involving chemical or biological agents.

In view of the conflicting information and the substantial investments being made to counter an uncertain threat, you asked us to review the scientific and practical aspects of a terrorist carrying out large-scale chemical or biological attacks on U.S. soil. Specifically, we examined the technical ease or difficulty for terrorists to acquire, process, improvise, and disseminate certain chemical and biological agents that might cause at least 1,000 casualties (physical injuries or deaths)—the number DHHS uses for planning purposes—without the assistance of a state-sponsored program. You also asked us to determine the extent to which the U.S. government has assessed the threats and risks posed by chemical and biological terrorism in the United States to serve as a basis for planned investments. As agreed with your offices, for the purposes of our work, we defined terrorists as non-state actors not provided with a state-developed weapon. The terrorists could be of foreign or domestic origin and would be operating illegally and outside a state-run laboratory infrastructure or weapon program. As also agreed, we will later report on the mechanisms in place to track medical inventories and the adequacy of medical inventory tracking systems.

Results in Brief

Chemical and biological experts and intelligence agency officials believe that the ease or difficulty for terrorists to cause mass casualties with an improvised chemical or biological weapon[2] or device depends on the chemical or biological agent selected. Experts from the scientific, intelligence, and law enforcement communities told us that terrorists do not need sophisticated knowledge or dissemination methods to use toxic industrial chemicals such as chlorine. In contrast, terrorists would need a relatively high degree of sophistication to successfully cause mass casualties with some other chemical and most biological agents. Specialized knowledge would be needed to acquire the right biological agent or precursor chemicals,[3] process the chemical or biological agent,

[2]A few biological agents (e.g., plague and smallpox) are communicable and can be spread beyond those directly affected by the weapon or dissemination device. Every biological agent, even one that is highly communicable, must be disseminated by some means that infects enough individuals to initiate a disease epidemic.

[3]Precursor chemicals are materials from which chemical agents are synthesized.

improvise a weapon or device, and effectively disseminate the agent to cause mass casualties. Throughout the different stages of the process, terrorists would run the risk of hurting themselves and of being detected and would have to overcome technical and operational challenges. Some virulent biological agents and precursor chemicals are difficult to obtain, and others are difficult to process or produce, especially in the quantities needed to cause mass casualties. In addition, effective dissemination of chemical and biological agents can be disrupted by environmental and meteorological factors. Terrorists with less sophistication could make a chemical or biological weapon and disseminate agents, but these would be less likely to cause mass casualties. Preventive measures and medical treatments are available for some, but not all chemical and biological agents that might be used by terrorists.

The intelligence community has recently produced National Intelligence Estimates (NIE) and other high-level analyses of the foreign-origin terrorist threat that include judgments about the more likely chemical and biological agents that would be used. Unlike the foreign-origin terrorist threat, the Federal Bureau of Investigation's (FBI) analysts' judgments concerning the more likely chemical and biological agents to be used by domestic-origin terrorists have not been captured in a formal, authoritative, written assessment. A formal assessment of the domestic-origin threats, combined with existing assessments of the foreign-origin threat, would provide an authoritative, written, comprehensive, intelligence community view on specific chemical and biological terrorist threats. Moreover, a national-level risk assessment of potential chemical and biological terrorist incidents also has not been performed. A risk assessment is a decision-making support tool that is used to establish requirements and prioritize program investments. Soundly performed risk assessments could help ensure that specific programs and related expenditures are justified and targeted according to the threat and risk of validated terrorist attack scenarios generated and assessed by a multidisciplinary team of experts. To perform a sound risk assessment, a multidisciplinary team of experts would use valid, current, documented threat information, including NIEs, to develop valid threat scenarios, rank the likelihood of a successful attack, and assure that program countermeasures are not based solely on worst-case scenarios.

We have previously reported that federal programs to combat terrorism, such as DHHS' national pharmaceutical and vaccine stockpile, are being initiated without the benefit of a sound threat and risk assessment process that helps prioritize and focus investments on appropriate

countermeasures and programs.[4] In the case of the DHHS national stockpile initiative, without valid threat and risk assessments, we question whether stockpiling for the items and quantities discussed in the Department's plan is the best approach for investing in medical preparedness.

We are recommending that the Attorney General direct the FBI Director to produce an authoritative threat assessment of the more likely chemical and biological agents that would be used by domestic-origin terrorists working outside a state-run laboratory infrastructure. In addition, we are recommending that the Attorney General direct the FBI Director to sponsor a national-level risk assessment using NIEs and other inputs to help guide and prioritize appropriate countermeasures and programs designed to combat chemical and biological terrorism.

Background

The 1995 attack by Aum Shinrikyo, an apocalyptic religious sect, in the Tokyo subway using the chemical nerve agent sarin elevated concerns about chemical and biological terrorism. Twelve people were killed and many more were injured as a result of that incident. Some experts have noted that despite substantial financial assets, well-equipped laboratories, and educated scientists working in the laboratories, Aum Shinrikyo did not cause more deaths because of the poor quality of the chemical agent and the dissemination technique used. Although not as widely publicized, a limited number of incidents involving biological agents have also occurred in the United States. For example, in 1984, the Rajneeshee religious cult in Oregon contaminated salad bars in local restaurants with salmonella bacteria to prevent people from voting in a local election. Although no one died, 751 people were diagnosed with the food-borne illness.

These events and concerns about other threats prompted Congress to establish a commission to assess the federal government's organization concerning weapons of mass destruction proliferation and to make

[4] Combating Terrorism: Observations on Federal Spending to Combat Terrorism (GAO/T-NSIAD/GGD-99-107, Mar. 11, 1999); Combating Terrorism: Threat and Risk Assessments Can Help Prioritize and Target Program Investments (GAO/NSIAD-98-74, Apr. 9, 1998); and Combating Terrorism: Observations on Biological Terrorism and Public Health Initiatives (GAO/T-NSIAD-99-112, Mar. 16, 1999).

recommendations for improvements.[5] In July 1999, the commission concluded that the United States is not effectively organized to combat the threat of nuclear, chemical, and biological weapons proliferation. The commission believes that an effective capability to respond to the use of these weapons by state or subnational groups, whether at home or abroad, is critical not only in the event of an attack, but also as a deterrent. This panel recommended that the President name a national director for combating proliferation who could coordinate the response of government agencies.

While intelligence agencies continuously assess and report on various threats, an NIE analyzes issues of major importance and long-term interest to the United States and is the intelligence community's most authoritative projection of future developments in a particular subject area.[6] An NIE is intended to help decisionmakers think through critical issues by presenting the relevant key facts, judgments about the likely course of events in foreign countries, and the implications for the United States. Examples of critical issues are threats from foreign terrorism and foreign missiles. NIEs are generally focused on foreign-origin threats. The National Intelligence Council (NIC), an organization composed of 12 National Intelligence Officers--including one from the FBI--who report directly to the Director of Central Intelligence, produces NIEs. To prepare an NIE, the NIC brings together analysts from all the intelligence agencies that have expertise on the issue under review.[7] In the final analysis, an NIE is the Director of Central Intelligence's assessment, with which the heads of the U.S. intelligence agencies concur, except as noted in the NIE's text. Other high-level intelligence community products include Intelligence Community Assessments.

Intelligence and law enforcement threat information is a key input into a risk assessment process. Risk assessments are widely recognized as valid

[5]The Intelligence Authorization Act for Fiscal Year 1997 (P.L. 104-293) created the commission. The Omnibus Consolidated and Emergency Supplemental Appropriations Act for Fiscal Year 1999 (P.L. 105-277) extended the commission's reporting deadline to July 18, 1999. John Deutch, former Director of Central Intelligence, was the commission's chairman. Senator Arlen Specter served as vice chairman.

[6]Foreign Missile Threats: Analytic Soundness of Certain National Intelligence Estimates (GAO/NSIAD-96-225, Aug. 30, 1996).

[7]The following organizations may participate in preparing an NIE: NIC, Central Intelligence Agency, Defense Intelligence Agency, National Security Agency, State Department's Bureau of Intelligence and Research, FBI, intelligence organizations of the Departments of the Treasury and Energy, and military services.

decision support tools to establish and prioritize program investments and are grounded in risk management, an approach to dealing with security issues. Risk management is the deliberate process of understanding risk—the likelihood that a threat will harm an asset or individuals with some severity of consequences—and deciding on and implementing actions to reduce it. A threat analysis--the first step in determining risk--identifies and evaluates each threat on the basis of various factors such as its capability and intent to attack an asset and the likelihood and the severity of the consequences of a successful attack. Valid, current, and documented threat information, including NIEs, in a risk assessment process is crucial to ensuring that countermeasures or programs are not based solely on worst-case scenarios and are therefore out of balance with the threat. Risk management principles acknowledge that (1) while risk generally cannot be eliminated, it can be reduced by enhancing protection from validated and credible threats and (2) although many threats are possible, some are more likely to be carried out than others. Risk assessments form a deliberate, analytical approach that results in a prioritized list of risks (i.e., threat-asset-vulnerability combinations) that can be used to select countermeasures to create a certain level of protection or preparedness. Because threats are dynamic and countermeasures may become outdated, it is generally sound practice to periodically reassess threat and risk. To perform a realistic risk assessment of terrorist threats, a multidisciplinary team of experts would require several inputs, including written foreign and domestic threat analyses from the intelligence community and law enforcement.

Chemical and biological agents pose different sets of problems for emergency planning and preparedness. For example, most chemicals quickly affect individuals directly exposed to the agent within a given geographical area. In contrast, the release of a biological agent may not be known for several days, and both perpetrators and victims may be miles away from the point of release when an incident is identified. Also, some biological agents produce symptoms that can be easily confused with influenza or other less virulent illnesses. If communicable, the biological agent can spread throughout the population.

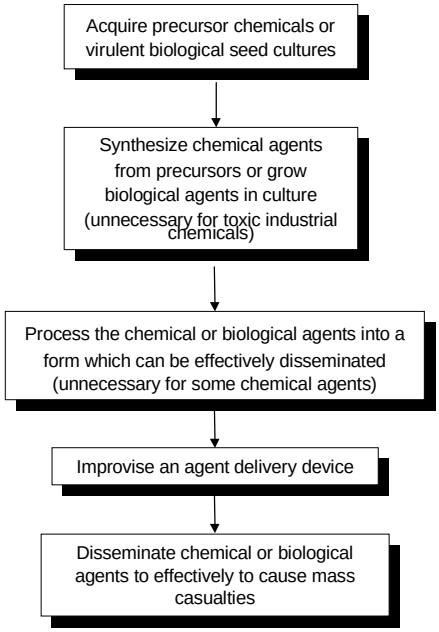
Many federally funded programs and initiatives have been established to better prepare for dealing with a possible large-scale chemical or biological terrorist incident, but no federal agency has defined what constitutes mass casualties. The Federal Emergency Management Agency, the Department of Defense (DOD), the Department of Justice, and DHHS (including CDC) do not have a working definition of what constitutes mass casualties. The

metropolitan medical response systems that DHHS is establishing across the nation use 1,000 casualties as a basis for planning local medical systems and for equipping and supplying the response teams.[8] DHHS acknowledges that this number is arbitrary but believes it is reasonable for planning purposes. Other federal agency representatives stated that whatever number overwhelms the local medical system could be considered mass casualties.

Terrorists operating outside a state-run laboratory infrastructure would have to improvise a weapon or device and effectively disseminate an agent through a delivery system. There are different stages in the process of improvising a chemical or biological weapon to cause mass casualties. Figure 1 shows the stages required for such an undertaking.

[8]Combating Terrorism: Opportunities to Improve Domestic Preparedness Program Focus and Efficiency (GAO/NSIAD-99-3, Nov. 12, 1998) and Combating Terrorism: Observations on the Nunn-Lugar-Domenici Domestic Preparedness Program (GAO-T-NSIAD-99-16, Oct. 2, 1998).

Figure 1: Stages for Terrorists Working Outside a State-run Laboratory to Conduct Chemical and Biological Terrorism



Source: GAO, on the basis of analysis and discussion with chemical and biological warfare experts.

Scope and Methodology

To perform our review, we obtained lists of potential chemical and biological agents that might be used by terrorists from intelligence agencies, military medical health experts, the FBI, and documents provided by government officials. We discussed in detail the characteristics of these agents with numerous experts in the disciplines of science, medicine, law enforcement, intelligence, and chemical and biological warfare. We spoke with and obtained documentation from officials at the U.S. Army Medical Research Institute of Infectious Diseases in Frederick, Maryland; the CDC in Atlanta, Georgia; the DHHS Office of Emergency Preparedness in Rockville, Maryland; the Department of Veterans' Affairs in Washington, D.C.; the Soldier and Biological Chemical Command and its Technical Escort Unit in Edgewood, Maryland; and the Defense Threat Reduction Agency in Dulles, Virginia. We discussed the production, weaponization, and dissemination of chemical and biological agents with experts formerly with U.S. and foreign biological warfare programs and with several medical and scientific experts in academia. We analyzed manuals, handbooks, and

texts on infectious diseases and biological and chemical casualties. We gathered and reviewed materials, studies, and reports on chemical and biological terrorism and attended conferences on the topic.

To develop the report's appendixes on selected chemical and biological agents, we analyzed and summarized information obtained from different sources. Specifically, for chemical agents, we reviewed Army Field Manual 3-9, Potential Military Chemical/Biological Agents and Compounds, as well as other information that we supplemented with discussions with the Defense Threat Reduction Agency and CDC. The primary source of our appendix on selected biological agents was the Medical Management of Biological Casualties Handbook (July 1998) by the U.S. Army Medical Research Institute of Infectious Diseases. Also, we discussed the characteristics of each biological agent with infectious disease experts, including those from the U.S. Army Medical Research Institute of Infectious Diseases and CDC. Renowned academicians from Stanford University, Johns Hopkins University, the Rockefeller University, the Monterey Institute of International Studies, and RAND Corporation provided information from the disciplines of physics, meteorology, virology, biology, microbiology, and terrorism—all of which are technical and operational aspects of chemical and biological terrorism. Biological warfare experts formerly with offensive programs of the United States, the United Kingdom, and the former Soviet Union gave us detailed information on the acquisition, growth, production, and dissemination of biological agents. We also discussed biological and chemical agents and obtained documentation from chemical and biological defense experts and the Defense Threat Reduction Agency. We reviewed classified documents and reports from the intelligence community and unclassified handbooks, manuals, textbooks, reports, and other open-source materials. Chemical and biological experts reviewed portions of the draft report and provided comments. In addition, technical experts from the Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict reviewed the draft appendixes and offered comments as appropriate.

As agreed with your offices, we limited our review to terrorist chemical or biological attacks that could be carried out by individuals or groups without access to state-run laboratories or weapon programs and that would not receive chemical or biological agents or weapons from such countries. We assumed that potential terrorists would have to acquire a biological agent or precursor chemicals, produce the agent, weaponize the agent, and deliver it. We limited our evaluation to agents that could cause mass casualties using the DHHS planning guidance of 1,000 casualties. We

focused on methods that cause mass casualties among humans by means of improvised weapons or devices and not through contamination of water, food supply, agriculture, or livestock.

Officials from individual intelligence agencies briefed us and provided access to analyses on specific chemical and biological agents and on the threat of chemical and biological terrorism in general. In addition, we reviewed pertinent NIEs and Intelligence Community Assessments. We also reviewed other intelligence analyses related to terrorism. FBI officials provided their assessment of the domestic-origin terrorist threat and information on past cases of terrorism, including data on terrorist incidents in the United States from 1987 through 1998.

We interviewed and obtained documentation from DHHS and CDC officials about the proposed national stockpile of pharmaceuticals and vaccines, including the methodology used in developing an operating plan to establish a stockpile and continuing efforts to further develop the stockpile. Information on the threat and risk assessment process was developed in our previous work on combating terrorism.

Ease or Difficulty Depends on Chemical or Biological Agent Selected

Chemical and biological experts and the intelligence agencies believe that the ease or difficulty with which terrorists could cause mass casualties with an improvised chemical or biological weapon[9] or device depends on the chemical or biological agent selected. Experts from the scientific, intelligence, and law enforcement community told us that terrorists do not need sophisticated knowledge or dissemination methods to use toxic industrial chemicals. In contrast, these experts believe that terrorists face serious technical and operational challenges at different stages of the process (described in fig. 1) to cause mass casualties when working with other chemical or any biological agents in the scope of our review.

According to these experts, to cause mass casualties with many chemical and all biological agents in our review, terrorists would have to handle the risk of hurting themselves and of being detected, overcome acquisition and production difficulties, and effectively disseminate a chemical or biological

[9]A few biological agents (e.g., plague and smallpox) are communicable and can be spread beyond those directly affected by the weapon or dissemination device. Every biological agent, even those that are highly communicable, must be disseminated by some means that infects enough individuals to initiate a disease epidemic.

agent. In addition, these experts believe that capability, access, and specialized knowledge that are not readily available are needed when weaponizing or disseminating certain chemical agents and nearly all biological agents. Further, obtaining access to the proper strains of biological agents is a difficult hurdle to overcome. Chemical experts believe that many variables may deter terrorists from using chemical agents (other than toxic industrial chemicals). For example, precursor chemicals necessary for the production of some chemical agents are controlled by the 1993 Chemical Weapons Convention that has been in force since April 1997. According to chemical experts, illegal acquisition of precursor chemicals would raise suspicions and attention due to the provisions of the convention. Moreover, the Special Assistant to the Director of Central Intelligence for Nonproliferation recently testified that "the preparation and effective use of BW [biological weapons] by both potentially hostile states and by non-state actors, including terrorists, is harder than some popular literature seems to suggest."[10]

Individuals with expertise in the disciplines of chemistry, biology, virology, microbiology, physics, meteorology, and former chemical and biological warfare programs described the more salient technical and operational challenges of working with chemical and biological agents. We discuss these challenges in more detail in the following chemical and biological sections. Specifically,

- the right precursor chemicals and biological agents or strains are very difficult to obtain, and some chemical and many biological agents are difficult to produce, especially in sufficient quantities to produce mass casualties;
- except if using toxic industrial chemicals, terrorists would need a relatively high degree of sophistication to successfully and effectively process agents, improvise a device or weapon, and disseminate the agents to cause mass casualties;
- a crude weapon can be made with less sophistication, but it would be less likely to cause mass casualties;
- environmental (e.g., pollution) and meteorological conditions (e.g., sun, rain, mist, and wind) might disrupt the effective dissemination of chemical and biological agents; and

[10]Unclassified statement on the worldwide biological warfare threat to the House Permanent Select Committee on Intelligence, March 3, 1999.

- location of the weapon or device (interior or exterior) can play a critical role in its effectiveness.

Ease and Difficulty of Using Chemical Agents

Experts from the scientific, intelligence, and law enforcement communities we spoke with agreed that toxic industrial chemicals can cause mass casualties and require little if any expertise or sophisticated methods. Generally, toxic industrial chemicals can be bought on the commercial market or stolen, thus avoiding the need to manufacture them. Chlorine, phosgene, and hydrogen cyanide are examples of toxic industrial chemicals. DOD classified further details concerning the use of toxic industrial chemicals.

Experts believe that unlike toxic industrial chemicals, for various reasons, most G and V chemical nerve agents are technically challenging for terrorists to acquire, manufacture, and produce. Examples of the G-series nerve agents are tabun (GA), sarin (GB), and soman (GD). VX is an example of a V-series nerve agent. According to chemical experts, developing nerve agents requires synthesis of multiple precursor chemicals. On the basis of our review of a technical report,[11] we concluded that some steps in the production process are difficult and hazardous. Although tabun production is relatively easy, containment of a highly toxic gas (hydrogen cyanide) is a technical challenge. Production of sarin, soman, and VX requires the use of high temperatures and generates corrosive and dangerous by-products. Moreover, careful temperature control, cooling of the vessel, heating to complete chemical reactions, and distillation could be technically infeasible for terrorists without a sophisticated laboratory infrastructure. Blister chemical agents such as sulfur mustard, nitrogen mustard, and lewisite can be manufactured with ease or with only moderate difficulty. However, experts told us that buying large quantities of the precursor chemicals for these agents is difficult due to the Chemical Weapons Convention. Appendix I describes some chemical agents' key characteristics that we developed on the basis of technical data and reviews with experts. DOD classified additional details for appendix I.

Chemical experts believe that chemical agents need to be in vapor or aerosol form (a cloud of suspended microscopic droplets) [12] to cause

[11] Technologies Underlying Weapons of Mass Destruction, U.S. Congress, Office of Technology Assessment (Dec. 1993).

[12] Fog and smoke are examples of visible aerosols.

optimal inhalation exposure to cause an effect. Vapors and aerosols remain suspended in the air and are readily inhaled deep into the lungs. Another method is to spray large droplets or liquid for skin penetration. A chemical agent could be disseminated by explosive or mechanical delivery. Further, chemical agents can be disseminated in vapor, aerosol, or bulk droplet form from delivery devices. According to the experts, terrorists could disseminate chemical agents using simple containers such as glass bottles with commercial sprayers attached to them or fire extinguishers. However, the chemical agent would need to withstand the heat developed if disseminated by explosives.

Moreover, according to chemical experts, the successful use of chemical agents to cause mass casualties requires high toxicity, volatility (tendency of a chemical to vaporize or give off fumes), and stability during storage and dissemination. Rapid exposure to a highly concentrated agent in an ideal environment would increase the number of casualties. These experts agree that disseminating a chemical agent in a closed environment would be the best way to produce mass casualties. Weather affects exterior dissemination, particularly sunlight, moisture, and wind. Some chemical agents can be easily evaporated by sunlight or diluted by water. The experts stated that it is also difficult to target an agent with any precision or certainty to kill a specific percentage of individuals outdoors. For example, wind could transport a chemical agent away from the designated target area.

General Difficulties of Using Biological Agents

According to experts in the many fields associated with the technical aspects of dealing with biological agents, including those formerly with state-sponsored offensive biological weapon programs, terrorists working outside a state-run laboratory infrastructure would have to overcome extraordinary technical and operational challenges to effectively and successfully weaponize and deliver a biological agent to cause mass casualties. Terrorists would require specialized knowledge from a wide range of scientific disciplines to successfully conduct biological terrorism and cause mass casualties. For example, biological agents have varying characteristics. Information and technical data from these experts, intelligence, and authoritative documented sources indicate that some biological agents such as smallpox are difficult to obtain.[13] In the case of

[13]Known smallpox culture stocks exist only in the United States at CDC and in Russia.

other biological agents such as anthrax[14] and tularemia (both of which are bacteria), it is difficult to obtain a virulent strain (one that causes disease and injury to humans). Other agents such as plague are difficult to produce. Biological toxins such as ricin require large quantities to cause mass casualties, thereby increasing the risk of arousing suspicion or detection prior to dissemination. Furthermore, some agents such as Q fever incapacitate rather than cause death. Finally, many agents are relatively easy to grow, but are difficult to process into a form for a weapon. Appendix II describes some biological agents' key characteristics we developed from technical documents and reviews with experts. DOD classified additional details for appendix II.

According to experts from former biological warfare programs, to survive and be effective, a virulent biological agent must be grown, handled, and stored properly. This stage requires time and effort for research and development. After cultivation, the agent is wet. Terrorists would need the means to sterilize the growth medium and dispose of hazardous biological wastes. Processing the biological agent into a weaponized form requires even more specialized knowledge. According to a wide range of experts in science, health, intelligence, and biological warfare and the technical report we reviewed, the most effective way to disseminate a biological agent is by aerosol. This method allows the simultaneous respiratory infection of a large number of people. Microscopic particles that are dispersed must remain airborne for long periods and may be transported by the wind over long distances. The particles are small enough to reach the tiny air sacs of the lungs (alveoli) and bypass the body's natural filtering and defense mechanisms. According to experts, if larger particles are dispersed, they may fall to the ground, causing no injury, or become trapped in the upper respiratory tract, possibly causing infections but not necessarily death. From an engineering standpoint, it is easier to produce and disseminate the larger particles than the microscopic particles. Other critical technical hurdles include obtaining the proper size equipment to generate proper size aerosols, calculating the correct output rate (speed at which the equipment operates), and having the correct liquid composition.

According to key experts with experience in biological warfare, biological agents can be processed into liquid or dry forms for dissemination. Both

[14]Anthrax is the disease caused by the biological agent Bacillus anthracis. Throughout the report we use the related disease term when referring to biological agents. We found that the disease term is used synonymously with the biological agent in discussions with the many experts we interviewed and documentation we reviewed.

forms pose difficult technical challenges for terrorists to effectively cause mass casualties. These experts told us that liquid agents are easy to produce. However, it is difficult to effectively disseminate aerosolized liquid agents with the right particle size without reducing the strength of the mixture. Further, the liquid agent requires larger quantities and dissemination vehicles that can increase the possibility of raising suspicion and detection. In addition, experts told us that in contrast, dry biological agents are more difficult to produce than liquid agents, but dry agents are easier to disseminate. Dry biological agents could be easily destroyed when processed, rendering the agent ineffective for causing mass casualties. A leading expert told us that the whole process entails risks. For example, powders easily adhere to rubber gloves and pose a handling problem. Effectively disseminating both forms of agent can pose technical challenges in that the proper equipment and energy sources are needed. A less sophisticated product and dissemination method can produce some illness and/or deaths. DOD classified further details on technical challenges of effectively processing and disseminating biological agents.

According to the experts we spoke with, exterior dissemination of biological agents can be disrupted by environmental (e.g., pollution) and meteorological (e.g., sun, rain, mist, and wind) conditions. Once released, an aerosol cloud gradually decays and dies as a result of exposure to oxygen, pollutants, and ultraviolet rays. If wind is too erratic or strong, the agent might be dissipated too rapidly or fail to reach the desired area. Interior dissemination of a biological agent through a heating and air conditioning ventilation system could cause casualties. But this method also has risks. Security countermeasures could intercept the perpetrators or apprehend them after the attack. Successful interior dissemination also requires knowledge of aerodynamics. For example, the air exchange rate in a building could affect the dissemination of a biological agent. Regardless of whether a liquid or dry agent is used in interior or exterior environments, experts believe that testing should be done to determine if the agent is virulent and disseminates properly. The numerous steps in the process of developing a biological weapon increase the chances of a terrorist being detected by authorities.

Availability of Pre- and Post-exposure Medical Treatments Varies

Medical preventive measures and treatments are available for some but not all chemical and biological agents. Early treatment following exposure to chemical agents is critical. The availability of effective medical defenses from or treatments for a chemical or biological agent could be a risk factor and influence terrorists' choice of weapon. The lack of an effective vaccine

or antibiotic/antiviral treatment for biological agents—or of an antidote for chemical agents—would pose a potential public health challenge but also pose a significant risk for terrorists as well. In the absence of medical defenses, a chemical or biological agent—if effectively acquired, processed, and disseminated—could become a more desirable choice because it might result in greater casualties. However, processing, testing, and disseminating the agent could equally endanger terrorists because they, too, would have no effective protection against the agent.

Medical and biological warfare experts agree that anthrax when inhaled is an agent of concern due in large part to the difficulty of diagnosis and treatment once symptoms appear and its very high lethality.[15] We recently testified on DOD's anthrax vaccination program,[16] pointing out that

- the anthrax vaccine is effective for preventing anthrax infections through the skin such as those sometimes contracted by unprotected workers who handle wool and hides and
- the vaccine appears to be effective against inhalation anthrax in some animal species for some, but not all, strains.

However, due to the absence of known correlates of immunity,[17] the results of the animal studies cannot be extrapolated with certainty to humans. DOD is in the process of vaccinating military personnel against anthrax. The efficacy of the vaccine for inhalation anthrax in humans has not been proven.[18]

According to CDC, supplies of the plague vaccine do not exist in the United States; however, small supplies of killed plague vaccine may exist in Australia and the United Kingdom. CDC does not consider a vaccine useful to control an outbreak nor protect a population against a terrorist incident. Further, there are no vaccines for other potential biological agents such as ebola and other hemorrhagic fevers, brucellosis, glanders, or

[15]Post-exposure treatment for inhalation anthrax consists of using the vaccine and the antibiotic ciproflaxin, but treatment must begin immediately after exposure and before the influenza-like symptoms appear. Because the symptoms mimic common influenza, proper diagnosis may come too late for effective treatment.

[16]Medical Readiness: Safety and Efficacy of the Anthrax Vaccine (GAO/T-NSIAD-99-148, Apr. 29, 1999).

[17]Correlates of immunity refer to biological markers that represent immunity against disease.

[18]DOD believes it is prudent to vaccinate U.S. military forces against anthrax exposure, even though efficacy for inhalation anthrax has been based on animal testing.

staphylococcal enterotoxin B. Similarly, there are no specific antidotes for a number of chemical agents such as the toxic industrial chemicals chlorine and phosgene. Treatment for exposure to these chemical agents consists largely of decontamination, first aid, and respiratory support. An antidote kit comprised of amyl or sodium nitrite exists for hydrogen cyanide. Appendixes I and II contain information on medical treatments for chemical and biological agents, respectively.

Prevention and treatments are available for a number of other agents. For example, there is an effective vaccine for known strains of smallpox, [19] and there are new investigative vaccines for several other possible biological agents, including botulinum, Q fever, Venezuelan equine encephalitis, and tularemia. Antidotes such as atropine, pralidoxime chloride, and diazepam can be used to counteract the effects of a number of chemical nerve agents. The treatment for some chemical and biological agents includes respiratory support with a ventilator. The types and quantities of vaccines, pharmaceuticals, and other items that should be available in the event of a chemical or biological attack can be determined through a methodologically sound threat and risk assessment.

U.S. Intelligence Assessments of the Foreign and Domestic Terrorist Threat in the United States

To determine the extent to which the foreign- and domestic-origin chemical and biological terrorist threat in the United States has been assessed, we obtained information from U.S. intelligence agencies. The U.S. intelligence community has issued classified NIEs and Intelligence Community Assessments that discuss the foreign-origin chemical and biological terrorist threat in some detail. However, the FBI's assessment of the chemical and biological agents that would more likely be used by domestic-origin terrorists working outside a state-run laboratory infrastructure has not been formally reflected in a written threat assessment. Producing assessments of both foreign- and domestic-origin threats could provide an authoritative, written, comprehensive intelligence community view on specific chemical and biological terrorist threats.

The possibility that terrorists may use chemical or biological materials may increase over the next decade, according to intelligence agencies. According to the Central Intelligence Agency (CIA), interest among

[19] Vaccination after exposure to weaponized smallpox or a case of smallpox is effective in preventing disease if given within 7 days after exposure. However, it is unclear whether post-exposure treatment with smallpox vaccine would be effective due to the difficulty in diagnosing the disease within 7 days.

non-state actors, including terrorists, in biological and chemical materials is real and growing and the number of potential perpetrators is increasing. The CIA also noted that many such groups have international networks and do not need to be tied to state sponsors for financial and technical support. Nonetheless, the CIA continues to believe that terrorists are less likely to use chemical and biological weapons than conventional explosives. We previously reported that according to intelligence agencies, terrorists are less likely to use chemical and biological weapons than conventional explosives, at least partly because chemical and biological agents are difficult to weaponize and the results are unpredictable.

Intelligence Analyses of the More Likely Chemical and Biological Terrorist Threat Agents

The intelligence community has analyzed and made judgments about the more likely foreign-origin chemical and biological terrorist threat agents. This information has been produced in a new NIE and Intelligence Community Assessments. The CIA classified the specific agents identified in intelligence assessments that would more likely be used by foreign-origin terrorists. The CIA also classified the intelligence judgments about the chances that state actors with successful chemical and/or biological warfare programs would share their weapons and materials with terrorists or terrorist groups. Unlike the foreign-origin threat, the FBI's analysts' judgments concerning the more likely chemical and biological agents that may be used by domestic-origin terrorists have not been captured in a formal assessment. However, FBI officials shared their analyses of the more likely biological and chemical threat agents on the basis of substances used or threatened in actual cases.

In analyzing domestic-origin threats, FBI officials grouped chemical and biological agents and did not specify individual agents as threats. Although the FBI has not addressed the specific types of chemical or biological weapons that may be used by domestic terrorists in the next 2 to 5 years, FBI officials believe that domestic terrorists would be more likely to use or threaten to use biological agents than chemical agents. The FBI's observation is based on an increase in reported investigations involving the use of biological materials. In 1997, of the 74 criminal investigations related to weapons of mass destruction, 30 percent (22) were related to the use of biological materials. In 1998, there were 181 criminal investigations related to weapons of mass destruction, and 62 percent (112) were related to the use of biological materials. Most of these investigations involved threats or hoaxes. The FBI estimated that in 1997 and 1998, approximately 60 percent of biological investigations were related to anthrax hoaxes.

The FBI ranks groups of chemical and biological agents on its threat spectrum according to the likelihood that they would be used.

- Biological toxins: any toxic substance of natural origin produced by an animal or plant. An example of a toxin is ricin, a poisonous protein extracted from the castor bean.
- Toxic industrial chemicals: chemicals developed or manufactured for use in industrial operations such as manufacturing solvents, pesticides, and dyes. These chemicals are not primarily manufactured for the purpose of producing human casualties. Chlorine, phosgene, and hydrogen cyanide are industrial chemicals that have also been used as chemical warfare agents.
- Biological pathogens: any organism (usually living) such as a bacteria or virus capable of causing serious disease or death. Anthrax is an example of a bacterial pathogen.
- Chemical agents: a chemical substance that is intended for use in military operations to kill, seriously injure, or incapacitate people. The FBI excludes from consideration riot control agents and smoke and flame materials. Two examples of chemical agents are sarin (nerve agent) and mustard gas (blister agent).

Risk Assessments Can Help Guide Investment Decisions for Chemical/Biological Preparedness Efforts

Risk assessments are widely recognized as valid decision-making support tools to establish and prioritize program requirements. We have previously reported on the need for threat and risk assessments performed by a multidisciplinary team of experts to properly focus programs and investments for combating terrorism and to establish program requirements.[20] Risk assessments incorporate but go beyond intelligence threat analyses by using a multidisciplinary team of experts to

- generate valid attack scenarios,
- assess and rank the risks (likelihood and severity of consequences) of the attack scenarios, and
- decide on actions or programs focused on reducing or otherwise dealing with the risks as assessed.

Risk assessments should include sound inputs and information, such as the best available intelligence and law enforcement information and analyses,

[20]Combating Terrorism: Threat and Risk Assessments Can Help Prioritize and Target Program Investments (GAO/NSIAD-98-74, Apr. 9, 1998).

including NIEs and Intelligence Community Assessments. Soundly established requirements could help ensure that specific programs and initiatives and related expenditures are justified and targeted, given the threat and risk of validated terrorist attack scenarios. We have testified and reported on several occasions[21] that individual government programs to combat terrorism have not been based on soundly determined requirements derived from a formal threat and risk assessment process.[22] A national-level assessment has not been performed that addresses the overall threat and risk of terrorism, including terrorist attacks using specific chemical or biological materials. Performing a sound threat and risk assessment at this level could provide a strategic guide to help shape, focus, and prioritize federal efforts to combat terrorism.

Many Counterterrorism Efforts Are Not Based on Risk Assessments

Individual agencies request funding for numerous programs and initiatives without the benefit of a threat and risk assessment. For example, under the Nunn-Lugar-Domenici Domestic Preparedness Program, first responders in 120 cities are being trained and equipped to enhance their capabilities to respond to terrorist chemical attacks, and DHHS is funding medical response teams in 27 cities as well as deployable national teams. The Department of Justice has sponsored training programs, has funded several centers and training venues related to combating terrorism, and is implementing an equipment grant program. The Army National Guard is establishing 10 of possibly 54 assessment and detection teams.

We recently testified about another example in which a threat and risk assessment process would be beneficial.[23] Beginning in fiscal year 1999, DHHS is establishing a national pharmaceutical and vaccine stockpile to prepare medical responses for possible use of chemical or biological weapons by terrorists. We found that several of the items DHHS plans to

[21] Combating Terrorism: Observations on Federal Spending to Combat Terrorism (GAO/T-NSIAD/GGD-99-107, Mar. 11, 1999); Combating Terrorism: Observations on Crosscutting Issues (GAO/T-NSIAD-98-164, Apr. 23, 1998); and Combating Terrorism: Spending on Governmentwide Programs Requires Better Management and Coordination (GAO/NSIAD-98-39, Dec. 1, 1997).

[22] However, several federal government organizations apply some formal threat and risk assessment process in their programs. For example, as required by the Federal Aviation Reauthorization Act of 1996 (P.L. 104-264), the Federal Aviation Administration and the FBI perform joint threat and vulnerability assessments on each airport determined to be high risk. The FBI provides threat data (i.e., intelligence and law enforcement information) that the Federal Aviation Administration is using to develop threat assessments specific to the airport or the metropolitan area in which the high-risk airport is located.

[23] Combating Terrorism: Observations on Biological Terrorism and Public Health Initiatives (GAO/T-NSIAD-99-112, Mar. 16, 1999).

procure (1) do not match intelligence agencies' judgments, as explained to us, of the more likely chemical and biological agents terrorists might use and (2) seem to be based on worst-possible consequence scenarios generated by an ad hoc interagency group of health and medical representatives. The DHHS decision-making process was not formal, based on a particular methodology, or documented and did not incorporate the many disciplines of knowledge and expertise or divergent thinking that is warranted to establish sound requirements for such an emerging, complex, and challenging threat. For example, experts in processing and weaponizing chemical and biological agents, intelligence, terrorism, law enforcement, and other related areas not necessarily associated with program and funding stakeholders would comprise a multidisciplinary team qualified to (1) generate valid threat scenarios, (2) assess and prioritize scenario risks in terms of likelihood and severity of consequences, and (3) determine appropriate countermeasures or other programmatic responses.[24] As we previously reported, without valid threat and risk assessments, we question whether stockpiling for the items and quantities discussed in the Department's plan is the best approach for investing in medical preparedness.

Conclusions

The ease or difficulty for terrorists to cause mass casualties with an improvised chemical or biological weapon or device depends on the agent selected. Experts agree that toxic industrial chemicals can cause mass casualties and require little if any expertise or sophisticated methods. Most chemical nerve agents, however, are technically challenging for terrorists to acquire, manufacture, and produce. Also, terrorists working outside a state-run laboratory infrastructure would have to overcome extraordinary challenges to effectively and successfully weaponize and deliver a biological agent and cause mass casualties. The intelligence community has issued NIEs and other assessments that discuss foreign-origin chemical and biological terrorist threats, including judgments about the more likely chemical and biological agents that would be used. However, the FBI has not produced a formal written assessment of its judgments concerning the most likely domestic-origin chemical and biological terrorist threats. Such an assessment would complement existing assessments of the foreign-origin threat and provide a comprehensive view of the threats. Taken together, these assessments of the foreign- and domestic-origin

[24]CDC officials told us that since CDC is responsible for establishing the stockpile, it intends to review the planned items and quantities based on a multidisciplinary assessment.

threats would be important inputs for a risk assessment that could help form the basis for and prioritize programs to combat chemical and biological terrorism.

Moreover, a sound national-level risk assessment that could provide a strategic guide to help shape, focus, and prioritize federal efforts to combat terrorism has not been performed. Such an assessment--which incorporates but goes beyond intelligence threat assessments--would be conducted by a multidisciplinary team of experts on intelligence, terrorism, chemical and biological agents, weapons, law enforcement, and health and could include other experts not necessarily associated with program and funding stakeholders. This team could use sound inputs, including NIEs, to (1) generate valid threat scenarios, (2) assess and prioritize scenario risks in terms of likelihood and severity of consequences, and (3) determine appropriate countermeasures or other programmatic responses. Without a valid threat and risk assessment, it is questionable whether federal agencies will be able to establish soundly defined program requirements and prioritize and focus the nation's investments to combat terrorism.

Recommendations

We recommend that the Attorney General direct the FBI Director to prepare a formal, authoritative intelligence threat assessment that specifically assesses the chemical and biological agents that would more likely be used by domestic-origin terrorists—non-state actors working outside a state-run laboratory infrastructure.

We further recommend that the Attorney General direct the FBI Director to sponsor a national-level risk assessment that uses national intelligence estimates and inputs from the intelligence community and others to help form the basis for and prioritize programs developed to combat terrorism. Because threats are dynamic, the Director should determine when the completed national-level risk assessment should be updated.

Agency Comments and Our Evaluation

DOD, CIA, the Department of Justice, and DHHS provided official comments on a draft of this report. Comments from DOD, CIA, and DHHS were classified and could not be printed in this report. Comments from the Department of Justice appear in appendix III. All of the agencies provided technical comments that we incorporated as appropriate.

DOD and CIA commented that recently produced intelligence community products partially responded to the first recommendation in our draft report. Also, Justice commented that the FBI is the appropriate entity to implement the recommendation. As originally written, our recommendation suggested that the Director of Central Intelligence request an NIE assessing the more likely chemical and biological terrorist threats and incorporate an FBI assessment of domestic-origin terrorist threats. On the basis of our subsequent review of these intelligence community documents, we believe that these assessments partially satisfy our recommendation. However, the intelligence community assessments do not incorporate a written, authoritative FBI analysis of the more likely chemical and biological threats from domestic-origin terrorists. As a result of our review of recent intelligence assessments and Justice's comments, we adjusted the recommendation to call for the Attorney General to direct the FBI Director to prepare a formal written assessment of domestic-origin threats.

DOD, the CIA, and Justice agreed with the second recommendation in our draft report calling for a national-level risk assessment. However, the CIA suggested that we change the wording so that the Director of Central Intelligence not be the sponsor of such a risk assessment. Justice stated that the FBI, as the lead agency in domestic terrorist incidents, is the appropriate federal agency for coordinating a threat and risk assessment. Justice also commented that it already had a statutory mandate to develop assessments similar to those we recommend in this report. We are aware that legislation requires the Attorney General, in consultation with the FBI and others, to develop and test methodologies for assessing the threat and risk of terrorist employment of weapons of mass destruction against cities and other local areas.[25] However, these assessments do not substitute for the broader national-level risk assessment that we are recommending in this report. The former assessments are intended to be city-specific whereas the latter would provide an overarching guide for program investments at the national level. At the time of our review, the FBI was considering methodologies for risk assessments at the city level, and had not yet actually performed such an assessment.

We agree that the FBI could sponsor a national-level threat and risk assessment. Further, the national-level threat and risk assessment process and results should provide a valuable guide for the city-specific threat and

[25]Section 1404(a) of the National Defense Authorization Act for Fiscal Year 1999 (P.L. 105-261).

risk assessments to be facilitated by the FBI. Based on Justice's comments, we have modified our recommendation to suggest that the Attorney General direct the FBI Director to sponsor a national-level threat and risk assessment. Justice otherwise generally concurred with the draft report.

DHHS generally agreed with our recommendations but commented that the assessment that we recommended should include all possible sources of the chemical and/or biological threats such as state-sponsored terrorists. The scope of our work was to examine aspects of the terrorist threat operating outside a state-run program. Nevertheless, we agree that a risk assessment should consider a wide range of possible chemical and biological threats. A multidisciplinary team of experts should then assess these possible threats in terms of their likelihood of occurrence and severity of consequences, since funding countermeasures for all possible scenarios is not likely to be affordable. Assessing the risk of these threats through generating validated scenarios would allow agencies to focus their program countermeasures and investments on the more likely scenarios with the more severe consequences.

DHHS also commented that we underestimated the threat of a bioterrorist event and relied on data that relates to war-zone activities and conditions and not specifically to urban and metropolitan civilian populations. As our report states, our objective was to assess the technical ease or difficulty of executing a successful, large-scale bioterrorist incident. To satisfy this objective, we obtained information from biological warfare experts who have in-depth experience and knowledge of processing and effectively disseminating biological agents to cause large numbers of human casualties (whether military or civilian). Also, we obtained information from a wide range of experts, including those in the fields of infectious diseases, virology, and civilian disaster management, and reviewed pertinent intelligence assessments. We believe that the collective expertise of those consulted for our report provided a sound basis for our conclusions about threats to civilian populations. We did not discuss biological warfare between combatants on a battlefield with these experts.

We conducted our work from September 1998 through April 1999 in accordance with generally accepted government auditing standards.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution of this report until 30 days after the distribution date. At that time we will send copies to

appropriate congressional committees, the federal agencies discussed in this report, and the Honorable Jacob Lew, Director, Office of Management and Budget. We will also make copies available to other interested parties upon request.

If you have any questions about this report, please contact me or Carol R. Schuster at (202) 512-5140. Key contributors to this report are Davi M. D'Agostino, Deborah A. Colantonio, Richard A. McGeary, and Richard H. Yeh.

Norman J. Rabkin
Director, National Security
Preparedness Issues

Contents

Figure

Abbreviations

CIA	Central Intelligence Agency
CDC	Centers for Disease Control and Prevention
CWC	Chemical Weapons Convention
DHHS	Department of Health and Human Services
DOD	Department of Defense
FBI	Federal Bureau of Investigation
IND	investigational new drug
NIC	National Intelligence Council
NIE	National Intelligence Estimate

Characteristics of Selected Chemical Agents

Agent	Ease of manufacture and precursor availability	Agent persistence	Lethality	First aid treatment	GAO observations[a]
Choking agents					
Chlorine (CL)	Industrial product. No precursors required.	Not persistent	Low	Move to fresh air. For skin contact, flush with water. No antidote. Provide supportive therapy for respiratory and cardiovascular functions.	Likely agent due to availability as a commercial product.
Phosgene (CG)	Industrial product. No precursors required.	Not persistent	Low	Move to fresh air. For skin contact, flush with water.	Likely agent due to its availability as a commercial product.
Nerve agents					
Tabun (GA)	Not readily available manufacturing instructions, but precursors available. Relatively easy to manufacture.	Intermediate	High	Move to fresh air. For skin contact, flush with water. Provide atropine or pralidoxime chloride or diazepam injections.	Likely agent due to availability of precursor chemicals and relative ease of manufacture.
Sarin (GB)	Moderately difficult to manufacture. Precursor chemical covered by Chemical Weapons Convention (CWC).	Not persistent	High	Move to fresh air. For skin contact, flush with water. Provide atropine or pralidoxime chloride or diazepam injections.	Likely agent due to demonstrated use by Aum Shinrikyo, although restrictions on precursors could create difficulties for production.
Soman (GD)	Difficult to manufacture. Precursor chemical covered by CWC.	Intermediate	High	Move to fresh air. For skin contact, flush with water. Provide atropine or pralidoxime chloride or diazepam injections.	Not likely agent due to difficulty of manufacture and control of precursor chemical.
GF	Moderately difficult to manufacture. Precursor chemical covered by CWC.	Intermediate	High	Move to fresh air. For skin contact, flush with water. Provide atropine or pralidoxime chloride or diazepam injections.	Not likely agent due to difficulty of manufacture and control of precursor chemical.
VX	Difficult to manufacture. Precursor chemicals covered by CWC.	High	Very high	Move to fresh air. For skin contact, flush with water. Provide atropine or pralidoxime chloride or diazepam injections.	Not likely agent due to difficulty of manufacture and control of precursor chemical.
Blood agents					
Hydrogen cyanide (AC)	Industrial product. Precursor chemicals covered by CWC.	Very low	Low to moderate	Move to fresh air. Provide supportive therapy. Provide amyl nitrite or sodium nitrite or sodium thiosulfate.	Likely agent due to its availability as a commercial product. Precursor availability may be a problem.

(continued)

Agent	Ease of manufacture and precursor availability	Agent persistence	Lethality	First aid treatment	GAO observations[a]
Cyanogen chloride (CK)	Not easily produced. Available as commercial product.	Low	Low to moderate	Move to fresh air. Provide supportive therapy. Provide sodium nitrite or sodium thiosulfate.	Likely agent, although precursor availability may be a problem.
Blister agents					
Sulfur mustard (HD)	Easy to synthesize. Large quantity buys of precursor chemicals without detection difficult. Precursors are covered by CWC.	Intermediate to high	Can produce incapacitation because of blistering. Can also produce death if inhaled or a toxic dose absorbed.	Flush skin with water and decontaminate clothing. Provide oxygen/intubation, bronchodilators.	Not likely agent due to difficulty in obtaining precursor materials and moderate production requirements.
Nitrogen mustard (HN-2)	Easy to synthesize. Large quantity buys of precursor chemicals without detection difficult. Precursor chemicals covered by CWC.	Intermediate	Can produce incapacitation because of blistering. Can also produce death if inhaled or a toxic dose absorbed.	Flush skin with water and Decontaminate clothing. Provide oxygen/intubation, bronchodilators. Provide culumine ophthalmic and topical antibiotics and dressings.	Not likely agent due to difficulty in obtaining precursor materials and moderate production requirements.
Nitrogen mustard (HN-3)	Easy to synthesize. Large quantity buys of precursor chemicals without detection difficult but available.	High	Can produce incapacitation because of blistering. Can also produce death if inhaled or a toxic dose absorbed.	Flush skin with water and Decontaminate clothing. Provide oxygen/intubation, bronchodilators.	Not likely agent due to difficulty in obtaining precursor materials and moderate production requirements.
Lewisite (L, HL)	Moderately difficult to manufacture and moderately difficult to acquire precursor chemicals.	Intermediate to high	Can produce incapacitation because of blistering. Can also produce death if inhaled or a toxic dose absorbed.	Flush skin with water and Decontaminate clothing. Provide British anti-lewisite for systemic effects.	Not likely agent due to difficulty in obtaining precursor materials and production requirements.

[a]Our observations are based on a research synthesis of discussions with experts in chemical warfare, science, intelligence, law enforcement, and medicine and of an analysis of manuals, handbooks, textbooks, studies, and reports on chemical agents.

Note: The following assumptions are used:

1. Dosage and concentration are maximized for an interior environment.

2. The venue occurs at a high-profile event where a large population has gathered.

3. The terrorists have the technical competence (first-year graduate student in chemistry) and motivation to obtain and implement the dispersion of agents.

4. The interior environment has an accessible heating, ventilation, and air conditioning distribution system.

Characteristics of Selected Biological Agents[1]

Agent	Ease to acquire and process	Agent stability	Lethality	Laboratory safety level[a]	Vaccine	Treatment	GAO observations[b]
Bacterial agents							
Inhalation anthrax	Difficult to obtain virulent seed stock and to successfully process and disseminate.	Spores are very stable. Resistant to sun, heat, and some disinfectants.	Very high.	Level 3.	Yes, primate tested. Some sources view efficacy for inhalation anthrax as questionable.	Virtually always fatal once symptomatic. Treatable very early with antibiotics and supportive therapy.	Possible terrorist biological agent, but requires sophistication to effectively manufacture and disseminate to create mass casualties. Use could indicate state sponsorship. Symptoms mimic flu and might not be quickly identified. Very high fatality rate once symptomatic. Not transmissible from person to person.
Plague	Very difficult to acquire seed stock and to successfully process and disseminate.	Can be long-lasting, but heat, disinfectants, and sun render harmless.	Very high.	Level 3.	No.	Very early treatment with antibiotics can be effective, supportive therapy.	Possible agent, but not likely. Fairly difficult to acquire suitable strain and difficult to weaponize.
Glanders	Difficult to acquire seed stock. Moderately difficult to process.	Very stable.	Moderate to high.	Level 3.	No.	Antibiotics, but no large therapeutic human trials.	Potential agent, but not easy for a non-state actor to acquire, produce, and successfully disseminate.
Tularemia	Difficult to acquire correct strain. Moderately difficult to process.	Generally unstable in environment. Resists cold but is killed by mild heat and disinfectants.	Moderate untreated, low treated.	Level 3.	Investigational new drug (IND).	Antibiotics very effective in early treatment.	Possible agent but difficult to stabilize. Low lethality when treated.
Brucellosis	Difficult to acquire seed stock. Moderately difficult to produce.	Very stable. Long persistence in wet soil or food.	Very low.	Level 3.	No.	Antibiotics moderately effective if given early when infected.	May not be a highly likely agent because of difficulty in obtaining virulent strain, long incubation period, and low lethality.

(continued)

Agent	Ease to acquire and process	Agent stability	Lethality	Laboratory safety level[a]	Vaccine	Treatment	GAO observations[b]
Q Fever (rickettsial organism)	Difficult to acquire seed stock. Moderately difficult to process and weaponize.	Stable. Months on wood and in sand.	Very low if treated.	Level 3.	IND. Tested in guinea pigs. Produces adverse reactions.	Self-limited illness without treatment. Antibiotics shorten illness.	Not a likely agent. Low lethality.
Viral agents							
Hemorrhagic fevers (e.g., Ebola)	Very difficult to obtain and process. Unsafe to handle.	Relatively unstable.	Depending on strain, can be very high.	Level 4.	No.	Antiviral drug and aggressive supportive care. Effectiveness of any treatment is questionable.	Unlikely agent due to difficulty in acquiring pathogen, safety considerations, and relative instability.
Smallpox	Difficult to obtain seed stock. Only confirmed sources in United States and Russia. Difficult to process.	Very stable.	Moderate to high.	Level 4.	Yes.	One potential antiviral, but generally no effective chemotherapy.	Very high consequence agent, but likelihood of usage questionable due to limited access to the pathogen beyond state actors.
Venezuelan Equine Encephalitis	Difficult to obtain seed stock. Easy to process and weaponize.	Relatively unstable. Destroyed by heat and disinfectants.	Low.	Level 3.	IND.	Supportive therapy, anticonvulsants. Antimicrobial therapy ineffective.	Possible agent if seed stock can be acquired, but unstable with low lethality.
Toxins							
Ricin	Readily available. Moderately easy to process but requires ton quantities for mass casualties.	Stable.	Very high.	Not available.	No, but candidate vaccines under development.	None (unless ingested).	Not a mass casualty agent.
Botulinum (Types A-G)	Widely available but high toxin producers not readily available or easy to process or weaponize.	Stable. Weeks in non-moving water and food. Deteriorates in bright sun.	High without respiratory support.	Level 3.	IND. Tested in primates. Toxoid vaccine against some types (A-E).	Antitoxin (IND) and respiratory support.	Difficult to weaponize and not considered a mass casualty agent.

Agent	Ease to acquire and process	Agent stability	Lethality	Laboratory safety level[a]	Vaccine	Treatment	GAO observations[b]
Staphylococcl Enterotoxin B	Difficult to acquire high yielding seed stock. Moderately difficult to process.	Very stable in dry form.	Low.	Not available.	No.	No effective antimicrobial treatment. Ventilatory support for inhalation exposure, fluid management.	Lower likelihood due to low lethality, lack of transmissibility.

[a]Biosafety level 3 applies to agents that may cause serious or potentially lethal disease as a result of exposure by inhalation. Among the many precautions is a ducted exhaust air ventilation system that creates directional airflow that draws air from clean areas into the laboratory toward contaminated areas. The exhaust air is not recirculated to any other area of the building and is discharged to the outside with filtration and other optional treatment. Passage into the laboratory is through two sets of self-closing doors and a changing room. Showers may be included in the passageway. Biosafety level 4 is required for work with dangerous and exotic agents that pose a high risk of aerosol-transmitted laboratory infections and life-threatening disease. A dedicated non-recirculating air ventilation system is provided. The supply and exhaust components are balanced to ensure directional airflow from the area of least hazard to the areas of greatest potential hazard. The differential pressure/directional airflow between adjacent areas is monitored and alarmed. The airflow in the supply and exhaust components is monitored, and the components are interlocked to ensure inward, or zero, airflow. A specially designed suit area requires a one-piece positive pressure suit that is ventilated by a life-support system. Entry to the area is through an airlock fitted with airtight doors. A chemical shower is provided to decontaminate the surface of the suit before the worker leaves the area.

[b]Our observations are based on a research synthesis of discussions with experts in biological warfare, science, intelligence, law enforcement, and medicine and of an analysis of manuals, handbooks, textbooks, studies, and reports on biological agents.

Comments From the Department of Justice

U. S. Department of Justice

Washington, DC 20530

JUL 16 1999

Mark E. Gebicke
Director
National Security Preparedness Issues
National Security and
International Affairs Division
U.S. General Accounting Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Gebicke:

On March 26, 1999 you provided the Department of Justice (DOJ) copies of a General Accounting Office (GAO) draft report entitled "Combating Terrorism: Need for Comprehensive Threat and Risk Assessments Focused on Chemical and Biological Attacks." The draft was reviewed by representatives of the Criminal Division and the Federal Bureau of Investigation (FBI). The DOJ generally concurs with the substance of the GAO draft, but believes that the GAO should consider redirecting its recommendations regarding the conduct of threat and risk assessments.

The draft report recommends that the Director of Central Intelligence request that the National Intelligence Council (NIC) prepare a national intelligence estimate (NIE) that specifically assesses the chemical and biological agents that would more likely be used by foreign and domestic-origin terrorists. The draft report further recommends that the Director of Central Intelligence sponsor a national-level risk assessment using national intelligence estimates and other inputs to help form the basis for and prioritize programs developed to combat terrorism. While the Department fully supports the substance of the recommendations in the GAO report, for several reasons, the Department believes that the FBI is the appropriate entity to implement those recommendations.

The Attorney General, in consultation with the FBI and appropriate federal, state and local officials, already has a statutory mandate to develop assessments similar to those recommended in the GAO report. Section 1404(a) of the National Defense Authorization Act for Fiscal Year 1999 provides that "The Attorney General, in consultation with the Director of the

Federal Bureau of Investigation and representatives of appropriate Federal, State, and local agencies, shall develop and test methodologies for assessing the threat and risk of terrorist employment of weapons of mass destruction against cities and other local areas. The results of the tests may be used to determine the training and equipment requirements under the program developed under section 1402. The methodologies required by this subsection shall be developed using cities or local areas selected by the Attorney General, acting in consultation with the Director of the Federal Bureau of Investigation and appropriate representatives of Federal, State, and local agencies."

The FBI's National Domestic Preparedness Office will compile these assessments, with the input of federal, state and local agencies. Both from a policy and resource perspective, the FBI should undertake any additional work of a similar nature to the extent that the GAO report recommends threat and risk assessments beyond that contemplated under current law. The DOJ also notes that the GAO has, in a previous report entitled, "Combating Terrorism: Threat and Risk Assessments Can Help Prioritize and Target Program Investments (GAO/NSIAD-98-74, April 9, 1998), recognized, at page 10, that the "FBI is in the best position to take the federal lead in facilitating city-specific threat and risk assessments" and recommended that the FBI do so with input and assistance from the intelligence community and appropriate federal agencies. The FBI, as the lead agency in domestic terrorist incidents, is also the appropriate federal agency for coordinating the effort recommended in the draft GAO report.

I hope the comments will be beneficial in completing the final report. My staff has forwarded technical comments to members of the review team. If you have any questions concerning the Department's comments, you may contact the Audit Liaison Office on (202) 514-0469.

Sincerely,

Stephen R. Colgate
Assistant Attorney General
for Administration

Related GAO Products

Combating Terrorism: Observations on Growth in Federal Programs (GAO/T-NSIAD-99-181, June 9, 1999).

Combating Terrorism: Analysis of Potential Emergency Response Equipment and Sustainment Costs (GAO/NSIAD-99-151, June 9, 1999).

Combating Terrorism: Issues to Be Resolved to Improve Counterterrorist Operations (GAO/NSIAD-99-135, May 13, 1999).

Combating Terrorism: Observations on Biological Terrorism and Public Health Initiatives (GAO/T-NSIAD-99-112, Mar. 16, 1999).

Combating Terrorism: Observations on Federal Spending to Combat Terrorism (GAO/T-NSIAD/GGD-99-107, Mar. 11, 1999).

Combating Terrorism: FBI's Use of Federal Funds for Counterterrorism-Related Activities (FYs 1995-98) (GAO/GGD-99-7, Nov. 20, 1998).

Combating Terrorism: Opportunities to Improve Domestic Preparedness Program Focus and Efficiency (GAO/NSIAD-99-3, Nov. 12, 1998).

Combating Terrorism: Observations on the Nunn-Lugar-Domenici Domestic Preparedness Program (GAO/T-NSIAD-99-16, Oct. 2, 1998).

Combating Terrorism: Observations on Crosscutting Issues (GAO/T-NSIAD-98-164, Apr. 23, 1998).

Combating Terrorism: Threat and Risk Assessments Can Help Prioritize and Target Program Investments (GAO/NSIAD-98-74, Apr. 9, 1998).

Combating Terrorism: Spending on Governmentwide Programs Requires Better Management and Coordination (GAO/NSIAD-98-39, Dec. 1, 1997).

Combating Terrorism: Federal Agencies' Efforts to Implement National Policy and Strategy (GAO/NSIAD-97-254, Sept. 26, 1997).

Chemical Weapons Stockpile: Changes Needed in the Management Structure of Emergency Preparedness Program (GAO/NSIAD-97-91, June 11, 1997).

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