

Bioterrorism Bulletin

Policy and Operational Guidance from the Bureau of Justice Assistance

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CDC Local Centers for Public Health Preparedness: Resources for Local Law Enforcement in Bioterrorism Planning, Prevention, and Response

In 1999 the Centers for Disease Control and Prevention (CDC) identified three public health agencies to serve as Centers for Public Health Preparedness. The three sites are the DeKalb County Board of Health (Georgia), Denver Health (Denver County, Colorado), and Monroe County Health Department (New York). Primarily, these three sites serve as learning resource centers for other local public health agencies. As such, they were asked by the CDC to develop capacities in three broad areas of interest:

- integrated communications and information systems to improve information sharing
- advanced operational readiness assessment to ensure appropriate preparedness and response capabilities
- comprehensive training and evaluation programs for public health workers and their partners

The National Association of County and City Health Officials (NACCHO) and the CDC are documenting the lessons learned from these three projects over the course of the funding period. To date, three reports have been completed, including two annual reports for 1999 and 2000 (published in 2000 and 2001), and a Resource Catalog for Bioterrorism and Emergency Response (published in 2002). The majority of “lessons learned” regard the role, responsibilities, and advancement of public health in bioterrorism preparedness and response. According to NACCHO and CDC, the three Centers for Public Health Preparedness discovered that “partnerships, collaborations and stra-

tegic linkages [are] critically important to enhancing their bioterrorism preparedness and emergency response capacity.” The sites have suggested that a multidisciplinary, “team-based” approach could be successful, especially if they partner with other agencies (including traditional emergency responders) in their own county and surrounding counties.

The role of law enforcement remained undefined early in the projects’ history and thus was scarcely mentioned in the annual reports, and when it was, the discussion mainly centered on federal law enforcement as opposed to local agencies. The FBI and National Guard (which under a Presidential directive may act in a law enforcement capacity in the event of a bioterrorism incident) were described as “non-traditional” partners. The authors of the first report (published in 2000) stated:

Law enforcement or traditional public safety officials may not realize the [disease] surveillance capacity of their local public health agencies, or the role the public health department will play in responding to a mass-casualty event in their jurisdiction.... With no detectable “crime scene” or explosion, traditional law enforcement and fire department response will not be necessary. Access to mass-prophylaxis, powers to quarantine, and plans for the management of hundreds of

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Information on the Centers for Public Health Preparedness collected for this article comes mainly from three reports, which can be found at these addresses:
http://www.naccho.org/files/documents/BT_CentersReport.pdf
<http://www.naccho.org/files/documents/CentersReportY2.pdf>
http://archive.naccho.org/Documents/BT_Year3Report.pdf

Local Centers for Public Health Preparedness, continued

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sick people are all resources that public safety officials may not realize are within many local public health agencies' purview.

Note that this report, published in 2000, predated the 9/11 terror attacks. Clearly, September 11 and the events that followed have shown that local law enforcement will play a key role in responding to such incidents, even without a "crime scene" or explosion." The fact remains, community members, local government, and other entities will still call on local law enforcement since it has the capacity to respond to crises quickly.

Despite the early view that a local law enforcement response will be unnecessary, the three centers have developed a number of resources aimed specifically at the local law enforcement community and therefore represent enormous potential for local public health-police partnerships. They include:

- *Bioterrorism tabletop exercises* (DeKalb County) that are intended to "raise awareness and initiate dialogue around issues including interagency cooperation, incident command, and agency specific roles and responsibilities during a bioterrorism event...."
- *Redundant response system tools* (Denver) the intent of which is to "rapidly notify key local public health partners using multiple modalities. The objectives are to 1) explore the functionality of alternative communication systems if traditional phone service is lost, 2) work with partners to establish communication methods and protocols, and 3) test the use of alternative methods during tabletop events."
- *Bi-directional communication and notification system* (Denver) that will allow partner

agencies to exchange information with each other. Two key objectives that involve law enforcement are "1) explore and research different emergency alert systems of potential benefit, [and] 2) identify community resources and agencies to be alerted during a public health emergency."

- *Emergency event tracking and notification* (Denver) to "efficiently receive, share key information, and disseminate in a secure manner with public health partners." The main objectives of this system are to "1) define the needs of an emergency tracking system for the health care community, 2) identify advantages of the current notification system...and assess their functionality as statewide multi-agency notification systems, and 3) explore and research different emergency notification systems and how data may be exchanged between those systems."

In addition, the Monroe Center for Public Health Preparedness offers three training courses aimed at local law enforcement: 1) Bioterrorism: What is Public Health?, 2) Bioterrorism: Management of Public Health Emergencies, and 3) Agents, Treatments, and Protection for the Health Care Worker.

The three centers provide other resources that are not specifically directed at law enforcement but are designed for the centers' "community partners." Those resources include response plans for bioterrorism and other public health emergencies, tabletop exercises, reporting systems, maps of local resources, and web-based materials.

Although not all the sites have proactively involved their local law enforcement agencies in bioterrorism preparedness efforts, local law enforcement agencies in those coun-

ties would surely be an integral part of any response to a bioterror or other significant biohazard event. At the very least, local law enforcement agencies would provide a significant amount of personnel and equipment and would respond to community residents' calls for service. Significantly, neither of the two annual reports specifically outlined roles, responsibilities, or capacities of local law enforcement.

Below is a brief discussion of how the centers might take greater advantage of the vast knowledge, experience, and resources of local law enforcement agencies. The main areas in which local law enforcement should be involved are preparedness planning, communications, and training/education.

Preparedness Planning

The three Centers for Public Health Preparedness have clearly taken a lead role in helping their respective communities prepare for a potential bioterrorist event. They provide evidence that local public health entities will play a major role in preparing for, responding to, and perhaps even preventing such an event. Local law enforcement agencies may indeed play little or no role in *handling* a bioterrorist event, especially if law enforcement officers are not the first to respond to the incident. They will, however, play a major role by organizing their personnel, equipment, and other resources to aid the main responders (e.g., fire service or other hazardous materials crews, public health officials, and federal agencies). Their role may increase dramatically if they are the first to identify and respond to a bioterrorist event.

Thus, from the outset, law enforcement agencies should be considered key partners in conversations about response plans, incident

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Forensic Science and Homeland Security: A Missing Component to a Complex Problem

By Barry Fisher, Crime Laboratory Director, Los Angeles County Sheriff's Office

Suppose terrorists mount coordinated attacks across the United States and abroad, intended to strike many targets at once. Historically, the FBI, FEMA, and other organizations provide assistance to local agencies in the aftermath of disasters with or without mass casualties. But what would happen if federal response resources were stretched thin and local and state jurisdictions were left on their own?

When it comes to identifying the perpetrators of terrorist acts, what is the role of state and local crime labs—facilities that could supply thousands of trained scientists throughout the United States in the event of a terrorist incident? Despite their contribution to the solution of other crime problems, local crime labs have largely been bypassed as a resource should a homeland security incident occur.

The result is that few state or local crime labs are fully prepared to help out after a terrorist incident. The prospect that forensic science personnel might actually be among the first responders or fulfill a critical support role for first responders remains to be fully considered—with all the accompanying implications. The time to plan a local forensic science response to a terrorist incident is not while it is unfolding or immediately afterwards, but now.

For over a decade—since well before the 9/11 terror attacks—public health experts and public safety first responders have been preparing for terrorist-related scenarios. Across the country, stakeholders in a WMD response meet

regularly to plan for terror attacks. However, local crime laboratory personnel often are conspicuously absent from these planning exercises. Perhaps this is due to a belief that federal resources will be sufficient to meet the needs of the projected situations. However, surely it makes good sense to tap all available scientific support, both before and after a terrorist incident.

If local public crime labs can provide scientific and technical support, a responsible position would be to determine where these resources fit into the preparedness equation—and then identify the resources to make that potential a reality.

Local crime labs, and many state ones as well, lack the capacity to handle large-scale terrorist incidents to the degree that the FBI laboratory or other federal agencies can. Nonetheless, in a WMD scenario, non-federal labs will play a role whether they are fully prepared or not. Public safety personnel will be intricately involved at all levels with pre- and post-terrorist incident events. Similarly, local forensic science personnel will likely be involved either as first responders or immediately following the first responders in a vital support capacity. They would be involved at the scene and in the laboratory as examiners of physical evidence through DNA testing, latent fingerprint examination, handwriting examination, and so on.

Ideally, before any of these indi-

viduals show up at a scene or become involved, careful consideration will be given to chemical, biological, radiological, and nuclear contamination of evidence, analysis of large volumes of evidence, evidence tracking, information coordination, training, and preparedness.

Federal agencies that will ultimately manage terrorist incidents have not considered what might be the appropriate role for state and local forensic science laboratories in terrorist incidents. There have been limited attempts to prepare local forensic practitioners for this assignment.

What steps might be taken to remedy the present situation? Just as the Department of Health and Human Services has brought state and local public health labs together under a “laboratory response network,” an appropriate federal agency should bring together state and local crime labs along with homeland security stakeholders to define a role for forensic science laboratories and begin planning how to use these resources.

If a national forum were convened to discuss forensic science and homeland security, some of the issues to discuss include identifying mass casualties by DNA; examining WMD-contaminated evidence at the crime lab; coordinating with state and local public health labs; training and equipping forensic science personnel; and integrating forensic science into WMD preparations. Now would be a good time to begin—before the next incident occurs.

The author can be contacted at the Los Angeles County Sheriff's Department, 2020 W. Beverly Blvd., Los Angeles, CA 90057. Phone: (213) 989-5002. E-mail: bajfisher@earthlink.net.

State and local forensic science labs should be made a part of homeland security planning.

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command structures (ICSs), resources, capabilities, and expectations. Involving local law enforcement and other first responders (e.g., fire and emergency medical technicians) during preparedness planning provides the opportunity to discuss, work through, and agree upon appropriate response techniques. Such conversations are important. One Center for Public Health Preparedness discovered gaps in its incident command and even some conflicts among agencies within the local public health community. Defining an all-incident command structure should be a priority, and all relevant agencies should be included in deliberations. These types of conversations would also lay the groundwork for fostering or strengthening key relationships that will be vital during a terror attack or similar crisis.

Communication

Two key issues surround the topic of communication: information sharing and telecommunications equipment. Open, consistent, and clear communication among partners is key since it shows a commitment from participating agencies to strengthen and maintain good relationships. The three centers noted various ways in which they made efforts to share information with local law enforcement agencies; however, it was unclear from the reports how successful those efforts were. While public health entities surely have a great deal of information that could be useful to local law enforcement agencies, police may also have information that could be of use to public health entities. Ensuring timely, consistent, and accurate information sharing between these two groups could prove to be the most useful of all preparedness efforts.

Communication before, during, and after a crisis is crucial. The

“who, what, when, and how” of communication must be identified before an event ever takes place. When a crisis such as a terror attack does occur, key individuals from all organizations will have already worked out how best to communicate with one another and what kinds of information should be routed to each agency involved.

Even with the best intentions, it is sometimes difficult to share information across agencies due to technological limitations. At least one center has made great strides in making all relevant community partners’ equipment compatible. Law enforcement and fire departments that have recently made technological upgrades of their communications equipment could prove useful in these endeavors.

Training and Education

Training and tabletop exercises should involve likely bioterror responders, including local law enforcement agencies. One center included the FBI and the National Guard as participants in its tabletop exercise. Another center focused its tabletop exercises on local public health entities as well as first responders such as police and fire agencies. Training together as a team will highlight any important gaps for agencies to correct. It will also provide an opportunity for personnel to begin to work with other agencies’ staff whom they will likely encounter during a real bioterror event. A joint training endeavor will also highlight agencies’ unique strengths that will be invaluable during a crisis.

Education and cross-training are absolutely key to effective bioterror planning and response. One

Center for Public Health Preparedness conducted a needs assessment with a number of agencies, including local police departments, and then developed distance-learning activities based on its findings. One center hosted basic overview training for local law enforcement, which covered public health responsibilities and powers, public health management, and the main biological agents and their effects on the body. In turn, law enforcement agencies could provide education and cross-training to public health agencies and other relevant community agencies.

It is critical for public health and other local agencies to understand how, when, and why the police will respond during a bioterror event. Training on general law enforcement tactics, capabilities, and equipment might provide non-police agencies with more realistic expectations of how law enforcement will react in biohazard situations.

NIOSH Provides PPE Guidance

When responding to chemical, biological, radiological, or nuclear (CBRN) event scenes, first responders need effective personal protective equipment (PPE). Where can law enforcement executives turn for help in selecting such gear?

The National Institute for Occupational Safety and Health (NIOSH), part of the U. S. Centers for Disease Control and Prevention (CDC), has developed standards for several varieties of PPE:

- self-contained breathing apparatus (SCBA) (see www.cdc.gov/niosh/npptl/scbasite.html)
- full facepiece air-purifying respirator (see www.cdc.gov/niosh/npptl/cbrnstdpg.html)
- escape respirator (see www.cdc.gov/niosh/npptl/aperstdpg.html)

Police and Public Health: Moving Toward Collaboration

Local law enforcement agencies have spent countless hours and dollars preparing for the possible release of a chemical, biological, radiological, or nuclear (CBRN) agent. While local law enforcement will play a critical role as a first responder to such an incident, it has become increasingly clear that public health agencies will be absolutely vital in responding to a CBRN event. Unfortunately, collaboration between law enforcement and public health agencies is rare.

Nevertheless, successful partnerships between police and public health agencies do exist. To identify them, the Police Executive Research Forum (PERF) recently surveyed a number of national organizations in the field of public health.

Each organization was asked whether it or its member agencies have (1) existing relationships with law enforcement agencies, (2) any existing bioterror or biohazard projects or activities that include local law enforcement, and (3) the desire to partner with local law enforcement agencies if they do not already do so. The organizations were also asked to describe how they might provide assistance or services to law enforcement.

The survey revealed that the organizations contacted do not directly work with local law enforcement. However, there is a movement toward collaborating with local law enforcement agencies, especially in preparedness efforts. The national organizations that participated in PERF's survey provided a wealth of information and resources that are available to local law enforcement agencies.

The Association of State and Territorial Directors of Health Promotion and Public Health

Education focuses on promoting community-based health education and disease prevention. The association identifies "methods of improving the quality and practice of health promotion and public health education," elicits "the cooperation of and coordination with national, public, private and voluntary agencies related to public health pro-

grams," and provides "a forum for continuing education opportunities in health promotion and public health education." Its membership includes 55 directors of health educa-

tion units of state health departments and the health departments of the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and American Samoa, as well as the 11 directors of the health education units of Indian Health Service Area Offices.

The association has published a document on emergency response communication, which can be found at www.astdhphe.org/model.asp.

The **Public Health Foundation** (PHF) helps build the capacity of public health systems to protect the public's health, including preparing for bioterrorism. Local law enforcement agencies may be interested in its list of distance learning courses on public health topics (www.train.org).

PHF also offers resources for developing and implementing training capacity plans, including those for bioterrorism preparedness. See www.phf.org/BT_Workforce_Prep_Resources101703.pdf.

In addition, PHF is assisting

the National Association of City and County Health Officials (NACCHO) in a new project to help local public health agencies better understand and communicate what they bring to their communities' bioterrorism and emergency preparedness efforts.

PHF can assist law enforcement agencies with the following:

1. *Low-cost, high-quality training materials.* The PHF bookstore offers videos, CD-ROMs, DVDs, and other training products related to bioterrorism and public health emergencies.
2. *Marketing and distribution of law enforcement training related to bioterrorism.* The PHF bookstore could carry, market, and distribute law enforcement training materials that would also be of interest to health professionals, including resources that would help them better understand the roles of law enforcement in bioterrorism preparedness and response.
3. *Publicity for training resources.* Law enforcement agencies can use www.train.org to promote their distance learning courses of interest to health professionals on. This is a free service.
4. *Referrals to organizations with expertise in bioterrorism training.* Topics include smallpox vaccination, risk communication, and bioterrorism-related competencies.
5. *Referrals to experts on public health law and emergency powers.* PHF is a partner in the Center for Law & the Public's Health at Johns Hopkins and Georgetown Universities. The center developed the Model Public Health Emergency Powers Act, which has been considered or enacted by many states.

The Association of Public

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Public health organizations are providing useful information to law enforcement agencies.

Police and Public Health: Moving Toward Collaboration, continued

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Health Laboratories (APHL) represents the directors of state and territorial government labs. Among other efforts, APHL has established the Laboratory Response Network for Bioterrorism and is involved in providing nationwide bioterrorism preparedness training for public health and clinical lab personnel. Further information is available at www.aphl.org/Emergency_Preparedness.

APHL's Laboratory Response Network accepts samples from many sources, including law enforcement. The association's study on lab preparedness for chemical terrorism included a recommendation that law enforcement, EMS, and hospital labs all receive training on that subject.

APHL can teach law enforcement to assume that dangers exist, even when it appears that no chemical, biological, or other agent is present. Law enforcement should know and follow a worst-case sce-

nario when on-scene so as to increase worker safety. APHL can also cross-train labs (including law enforcement labs) to preserve evidence and educate law enforcement about how to collect evidence.

The Injury Control and Emergency Health Services Section of the **American Public Health Association (APHA)** provided a Department of Defense workbook on joint law enforcement/epidemiology investigations. APHA also directed PERF to the Local Centers for Public Health Preparedness, funded by the Centers for Disease Control and Prevention. Based at selected local public health agencies in the U.S., the centers interact with local law enforcement in preparedness activities, such as tabletop exercises, drills, planning, and education. More information can be found at www.bt.cdc.gov/training.

Additional Resources

The following are additional public health resources that may be useful to law enforcement executives:

- Association of State and Territorial Health Officials (www.astho.org)
- National Association of Local Boards of Health (www.nalboh.org)
- National Association of County and City Health Officials (www.naccho.org)
- Partnership for Prevention (www.prevent.org)
- Council of State and Territorial Epidemiologists (www.cste.org)

Paper Examines Key Quarantine Issues for Law Enforcement Executives

In "Quarantine and Police Powers: The Role of Law Enforcement in a Biomedical Crisis," the Police Executive Research Forum examines key issues that may arise after a bioterror attack. The paper discusses the extent of police powers during crisis-level outbreaks of communicable disease and studies the relative authority of federal and state governments to contain such outbreaks. The issues are framed so as to help law enforcement executives balance the risks to public health against the rights of the individual.

Tens of millions of people catch

colds each year, but law enforcement stays uninvolved because the severity is low. By contrast, other diseases, such as smallpox, may justify severe restrictions, including quarantine and even, possibly, the use of deadly force. However, matching the restrictions to the threat is no easy feat. In the last two centuries, outbreaks of cholera and smallpox led to numerous quarantines by the federal and state governments. In nearly every instance, however, the quarantine proved too blunt an instrument, inadequately safeguarding those quarantined and provoking widespread civil unrest.

The threat of biological terrorism has once again made quarantine an issue for the health care community, public health officials, and first responders. "Quarantine and Police Powers" defines key terms; examines who has the legal authority to implement a quarantine; discusses the extent of police powers in enforcing a quarantine; names some of the difficulties police can expect during a quarantine; considers epidemiologic factors for making quarantine decisions; and presents a quarantine policy model.

The paper is available at www.ohlhausen.com/html/perf.html.

“First Responder Treatment and Resource Guide” Spells Out Prevention and Mitigation Steps to Protect Emergency Staff

To help law enforcement executives protect their officers who respond to biological, chemical, and radiological terrorist threats, the Police Executive Research Forum has produced a report that goes beyond the usual focus on personal protective equipment (PPE). The “First Responder Treatment and Resource Guide” not only describes the various agents and appropriate PPE, but also names vaccines, antidotes, and chemical agents that can dilute or neutralize the hazardous substances.

The driving force behind the guide is the need to better protect public safety’s first responders. PPE technology, such as breathing apparatus and protective suits, can provide valuable defenses against terrorist releases of biological, chemical, and radiological agents. However, several factors suggest that first responders may not be able to rely solely on PPE for their safety.

First, the cost of a full complement of equipment for agency personnel usually exceeds all available funding—including new Office of Domestic Preparedness (ODP) funds. Second, public safety personnel may be exposed to lethal pathogens in response settings before they become aware of the biohazard or terrorist dimension of the situation. In other words, they may walk into a biohazard situation when they think they are responding to an ordinary crime scene and have not yet suited up. Third, even with PPE, responders may still experience some exposure through skin or other contact. PERF believes that agency chief executives can benefit from knowledge of the additional degrees of protection offered by

vaccines, antidotes, and chemicals that dilute or neutralize the dangerous agents.

The guide addresses the following threats:

- biological agents (anthrax, botulinum toxin, ebola and Marburg viruses, plague, smallpox, and ricin)
- chemical agents (chlorine gas, cyanide gas and hydrogen cyanide, lewisite and mustard-lewisite, mustard gas and sulfur mustard, phosgene gas, and nerve agents tabun, sarin, soman, and VX)
- radiological dispersion devices (“dirty bombs”)
- nuclear fission devices (nuclear bombs)

For each type of threat, the guide describes treatments, vaccines or antidotes, exposure management and decontamination, and sources of additional information.

In addition, the guide describes the Strategic National Stockpile of vaccines and antidotes.

Most hospitals and medical centers in the United States have the antibiotics and supplies needed for treating exposure to the biological, chemical, and radiological agents covered in the guide. In the event of a terrorist attack or mass disease outbreak, additional supplies and uncommon antibiotics and vaccines would need to be ready and available. Further, in the face of credible terrorist threats, state and local first responders may need to have vaccinations and antidotes on hand, especially if a threat involves smallpox or fast-acting chemical agents.

The Homeland Security Act of 2002 tasked the Department of

Homeland Security (DHS) with defining the goals and performance

requirements of the national stockpile, as well as managing the actual deployment of medical materials and supplies. The Department of Health and Human Services (HHS) collaborates in the effort. The Strategic National Stockpile

(SNS) program includes antibiotics, chemical antidotes, antitoxins, life-support medications, IV administration, airway maintenance supplies, and medical/surgical items.

In the event of a declared emergency, SNS will immediately respond by sending out “12-hour push packages.” These packages are designed to provide a broad spectrum of assets for an ill-defined threat in the early hours of an event. Once the threat is better identified, additional specific supplies can be shipped. To receive supplies from the SNS, a state’s governor’s office must submit a request directly to the Centers for Disease Control or HHS.

PERF’s “First Responder Treatment and Resource Guide,” though still in draft form, can be viewed at www.ohlhausen.com/html/perf.html. For further information, please contact Clifford Karchmer, Police Executive Research Forum, 1120 Connecticut Avenue, NW, Suite 930, Washington, DC 20036, e-mail: ckarchmer@policeforum.org.

Personal protective equipment is not the only answer.

DoD National Defense University: A Resource for Homeland Security Preparedness

The National Defense University (NDU) is located at Ft. Leslie McNair in Washington, DC. Under the direction of the Office of the Secretary of Defense, NDU is one of the nation's leading institutions for advancing professional military education. Within NDU, various colleges and centers conduct research on topical issues of major importance to our national defense.

Many of NDU's research reports, monographs, and books are available free at www.ndu.edu. Hard copies are also for sale through the U. S. Government Printing Office. Topics include national security studies, military strategy, international affairs, leadership studies, military history, logistics, acquisition, joint and combined operation, and command and control, to name a few.

In addition, NDU intermittently publishes essays, papers, and bulletins—written by security experts and scholars from around the world—on the timeliest issues of national security.

The following are two publications that may be of particular interest to law enforcement executives studying the issue of bioterrorism:

“Agricultural Bioterrorism: A Federal Strategy to Meet the Threat”

Author Henry Parker, national program leader for aquaculture at the Agricultural Research Service in the U.S. Department of Agriculture, provides excellent insights for state and local policy makers considering biological threats. The 2001 anthrax mail attacks focused attention on biological threats that target humans directly. However, little thought has been given to the potential for agricultural bioterrorist acts or the implications for various agencies concerned with prevention and consequence management. Further, few emergency response policies prepared by state and local first responders address prevention and response to agricultural threats.

The paper discusses the vulnerability of U.S. agriculture to bioterrorist threats and identifies potential targets. It also discusses current measures to counter the threats and names strategies that should be implemented to reduce future agricultural threats.

The main recommendation in the paper is to implement a national interagency partnership among federal, state, and local agencies and the private sector. The paper also lists specific research needs for agricultural bioterrorism prevention and response, lists key federal and state agencies and programs, and provides a large reference section for additional information on agricultural bioterrorism and preparedness. The paper is

available on-line at www.ndu.edu/inss/mcnair/mcnair.html.

“Catastrophic Bioterrorism: What Is to Be Done?”

In 2003, the Center for Technology and National Security Policy (CTNSP), a division of NDU, released this paper to emphasize the importance of thoroughly preparing for large-scale emergencies. The paper outlines bioterrorism's impact on the United States and urges government policy makers and other leaders to develop a common, systemic understanding of the bioterrorist threat.

The paper also provides a framework for improving efforts to defend against bioterrorism, including improved federal management, bioterrorism threat detection, and vaccine availability and use. In addition, it discusses the problem of false bioterror alarms.

This paper is available on-line at www.ndu.edu/ctnsp/publications.html.

To Obtain Publications

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Program Manager: Dr. Steve Edwards, BJA
Project Director: Clifford Karchmer
Bulletin Editor: Peter Ohlhausen
Writers: Stacy Osnick Milligan and Drea Morozoff Luna