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ANTITERRORISM PROGRAMS

The Unthinkable Becomes Real for a Horrified World

BOSTON—As the wreckage of the World Trade Center and the Pentagon smoldered and the world began to take in the horror of last week's terrorist attacks, the unthinkable no longer seemed fantastic. If groups armed with little more than knives and pilot's training could bring about such mind-numbing devastation, what might they be capable of doing with weapons of mass destruction?

"Now, anything is possible," warned Allison MacFarlane, a Massachusetts Institute of Technology (MIT) nuclear security researcher, speaking at a hastily organized symposium here held less than 36 hours after the suicide attacks. Had the terrorists had a nuclear weapon, she noted gravely, "we might be facing the fact that New York City doesn't exist." Adds William Hoehn III, director of the Washington, D.C., office of the Russian-American Nuclear Security Advisory Council: "The rules of the game have changed, and the taboo against the mass killing of civilians has been broken."

The United States now spends more than half a billion dollars annually on research to defend against such attacks using weapons of mass destruction (see table on p. 2185). But researchers and antiterrorism experts agree that those efforts are badly organized, wasteful, and poorly coordinated. Despite a recent stream of blue-ribbon panel reports from Congress, the National Academies of Sciences (NAS), and the Pentagon's Defense Science Board that call for reform, the national effort remains a grab bag of programs spread across a half-dozen feuding federal agencies. Most lack adequate ties with local and state officials. "What we need are priorities and a long-range research agenda," pleads Michael Wermuth, chief of staff of a congressionally chartered panel led by Virginia Governor James Gilmore that will report in December on the country's capacity to respond to domestic terrorist attacks using weapons of mass destruction.

Point of impact. The Pentagon was functioning the day after being hit by a hijacked airliner.

Last week's attacks have already set off a quiet scramble at federal labs across the country to beef up efforts ranging from new biological and chemical detection techniques to profiling the behavioral patterns of terrorist cliques. But some scientists are worried that a rattled public will expect too much from them. "Technical solutions can't solve the problem" of terrorism, says Harvard biologist Matthew Meselson, a member of a 1998 NAS panel that examined U.S. responses to potential chemical and biological terrorism. Instead, many researchers and politicians—both in the United States and other nations—want the Bush Administration to change direction and lobby for stronger international controls on biological weapons and greater bilateral cooperation with Russia. Adds Paul Josephson, a science historian and nonproliferation expert at Colby College in Waterville, Maine, "Joint and multilateral programs are the only hope for nonproliferation."

Unholy trinity. Weapons of mass terror come in three flavors. The first is nuclear. Since 1992, there have been six known cases of highly enriched uranium or plutonium being intercepted by authorities as it passed in or out of the former Soviet Union. As to how much bomb-grade material has been successfully smuggled, "we have no idea,"

CREDITS: (PENTAGON) HILLERY SMITH GARRISON/AP; (WORLD TRADE CENTER) LAURA CAVANAUGH/UPI

Intense Fire Doomed Trade Center Towers

One hundred minutes after being struck near the 90th floor by a hijacked airliner, the 110-story, 415-meter-high North Tower of the World Trade Center collapsed into a six-story-high pile of rubble. Engineers and materials scientists are still analyzing the collapse, but they believe its primary cause to be the intense heat—up to 1000°C—from the nearly 30,000 kilograms of burning jet fuel.

The structure's core, floor supports, and tubelike outer frame—more than 200 columns that bore most of the building's weight—were formed by steel beams. But those beams would have become severely

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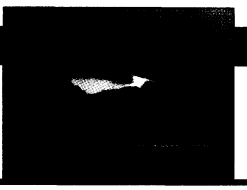

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says MacFarlane. Constructing a nuclear fission weapon, however, requires high-level expertise, substantial facilities, and lots of money—all three of which would be difficult, although not impossible, for a terrorist group to pull off without state support.

A second threat is chemical weapons. "But chemical weapons are really nasty to work with: You need organic chemists who know what they are doing," says Raymond Zalinskas, a former member of an Iraq weapons inspection team and now a researcher at the Monterey Institute of International Studies in San Francisco. "And there are technical issues with spraying." The 1995 nerve gas attack in the Tokyo subway, for example, injured thousands but killed only 12 people largely because sprayers clogged.

The third and most worrisome threat, according to many researchers, is biological. "Their potential for damage is much greater" than the chemical threat, says Harvard biochemist George Whitesides, who served on a Defense Science Board panel that examined the biological weapons threat in a recent report that was not publicly released. Among the most potent and potentially accessible agents are smallpox, anthrax, and plague.

A chilling exercise conducted this summer at Maryland's Andrews Air Force Base by a team of scientists, politicians, and reporters brought home just how devastating a biological attack could be. In a simulation that took the form of a sophisticated role-playing game, terrorists released smallpox in Oklahoma City. The limited amount of smallpox vaccine and the rapid infection rate soon overwhelmed public health measures. What began as two dozen cases ballooned into 3 million infected and 1 million dead across the country and overseas within 2 months. The U.S. government was left paralyzed, its citizens defenseless.

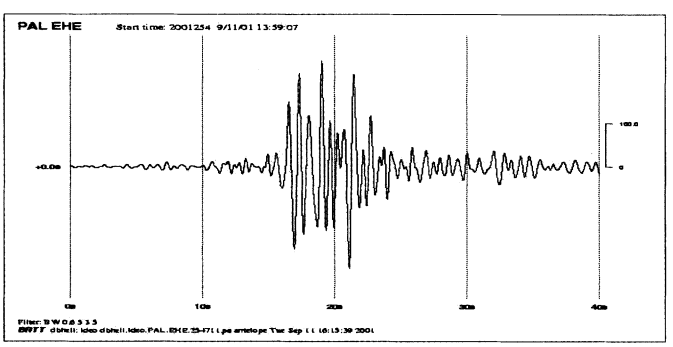
Talking about terrorism. MIT's Allison MacFarlane tells an anxious audience that "anything is possible" now.

A terrorist attack of plague could prove less lethal, as it can be fought with antibiotics. But the immense quantities required could strain the U.S. pharmaceutical system. An assault with anthrax could prove particularly disastrous. The dispersal of 100 kilograms could inflict up to 3 million deaths if spread evenly over a city on a windless night, according to a 1993 report by the congressional Office of Technology Assessment.

How real is the threat of a biological terror weapon? If terrorists are capable of the sort of sophisticated operation that occurred on 11 September, "then they can handle a biological weapon," says Donald Henderson of Baltimore's Johns Hopkins University Center for Civilian Biodefense Studies. Others are not so sure. The likelihood that terrorists could gain access to smallpox is extremely small, notes Zalinskas, unless there are secret caches in countries like Iraq. Plague is very difficult to handle, he adds, whereas anthrax dispersal poses complex technical hurdles.

One sobering lesson from last week's attacks is that terrorists could carry out potential mass destruction without sophisticated weaponry, by targeting U.S. nuclear or chemical facilities using conventional bombs or hijacked aircraft. "We're always fighting the last war in counterterrorism," says Jonathan Tucker, a terrorism expert at the Monterey Institute. "We must think strategically, as in a game of chess."

Coming together. But strategy requires clear priorities and organization. Neither are evident in the U.S. R&D efforts to defend against weapons of mass destruction. The White House National Security Council nominally oversees efforts scattered across the departments of Defense, Energy, State, Health and Human Services, the Environmental Protection Agency, and the Nuclear Regulatory Commission. But linking the varied activities—from developing new vaccines to building biological agent



CREDITS: (TOP TO BOTTOM) GRAHAM GORDON RAMSAY; LAMONT-DOHERTY SEISMOGRAPHIC NETWORK

degraded with sustained exposure to temperatures of 600°C and above. A deadly cascade began when the 20-centimeter-thick floors exposed to the most intense heat separated from the frame and fell onto the floors below, sending a shock wave down the structure. The accumulated weight caused the building to collapse vertically, as demonstrated by the TV antenna barely wavering as it began its descent.

The South Tower fell in a similar but less vertical collapse just 56 minutes after it was hit. The speed and tilt may have been caused by the plane's striking near one of the building's corners and more severely damaging its frame. Even so, engineers say that an unusually robust design prevented both towers from toppling immediately.

The towers were designed to survive a collision with the smaller airliners used in the 1970s, and the beams were covered with a fire-resistant material. But jet fuel fires are usually fought with special foam, experts note, not the water delivered by most building sprinkler systems. An investigative team organized by the American Society of Civil Engineers will begin its work once rescue operations cease, with its report due early next year.

Some 40 kilometers away, scientists at the Lamont-Doherty Earth Observatory in Palisades, New York, recorded the event on their seismometers (above). The 2.3-magnitude seismic shock was similar to the force from an earthquake that jostled Manhattan in January. –DAVID MALAKOFF