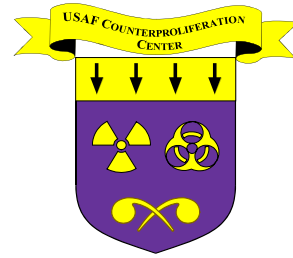


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USAF COUNTERPROLIFERATION CENTER

CPC OUTREACH JOURNAL



Air University

Air War College

Maxwell AFB, Alabama

Welcome to the CPC Outreach Journal. As part of USAF Counterproliferation Center's mission to counter weapons of mass destruction through education and research, we're providing our government and civilian community a source for timely counterproliferation information. This information includes articles, papers and other documents addressing issues pertinent to US military response options for dealing with nuclear, biological and chemical threats and attacks. It's our hope this information resource will help enhance your counterproliferation issue awareness.

Established here at the Air War College in 1998, the USAF/CPC provides education and research to present and future leaders of the Air Force, as well as to members of other branches of the armed services and Department of Defense. Our purpose is to help those agencies better prepare to counter the threat from weapons of mass destruction. Please feel free to visit our web site at www.au.af.mil/au/awc/awcgate/awc-cps.htm for in-depth information and specific points of contact. Please direct any questions or comments on CPC Outreach Journal to Jo Ann Eddy, CPC Outreach Editor, at (334) 953-7538 or DSN 493-7538. To subscribe, change e-mail address, or unsubscribe to this journal or to request inclusion on the mailing list for CPC publications, please contact Mrs. Eddy. The following articles, papers or documents do not necessarily reflect official endorsement of the United States Air Force, Department of Defense, or other US government agencies. Reproduction for private use or commercial gain is subject to original copyright restrictions. All rights are reserved

USAF CPC PRESENTS ANG "CONFLICT 21" WEBSITE

Focusing on homeland security, weapons of mass destruction issues and future total force concepts of operations (CONOPS) and other key issues, the Air Force Counterproliferation Center (CPC) at Maxwell Air Force Base recently unveiled the Air National Guard's (ANG) new **CONFLICT 21** website <http://c21.maxwell.af.mil> to the internet world.

According to **CONFLICT 21's** chief, Colonel Michael Ritz, "This unclassified site is intended to be used not only by Air National Guard members, but by all members of the armed forces and Department of Defense." Colonel Ritz also serves as a CPC associate director and ANG Advisor to the Director, CPC. "This website provides it's user a window into the world of counterproliferation of weapons of mass destruction, as well as a forum for examining the many elements of homeland security and homeland defense," said Colonel Ritz.

A key element of CPC's mission is the promotion of research and education in countering the spread of weapons of mass destruction. Developed by Colonel Ritz and Mike McKim of Air University's Air War College, **CONFLICT 21** provides researchers, students, military and government personnel and the general public unclassified, direct information and cross-links to a multitude of sources throughout the internet. "We hope to educate and enlighten all who make use of **CONFLICT 21** on a variety of matters critical to our nation and the world in the 21st century," says Colonel Ritz. "At the same, we want to provide a continuous flow of updated information for researchers, students and writers examining issues pertinent to those being examined by the ANG and USAF CPC now, and in the future," he concluded.

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Washington Times
November 1, 2002
Pg. 1

N. Korea Missile Threat Increases

By Bill Gertz, The Washington Times

North Korea is continuing to develop long-range missiles that threaten the United States and a basic defense system against them is about two years from deployment, the Pentagon's missile-defense chief said yesterday.

Air Force Lt. Gen. Ronald Kadish, director of the Missile Defense Agency, said North Korea's first long-range missile test in 1998 caught U.S. intelligence by surprise. As a result, missile-defense development efforts have shifted to meeting a range of threats rather than any specific danger from a single nation.

"Along the way, if we get threatened by North Korea, I think the American people understand we would not just sit by with five missiles in the hole and do nothing," Gen. Kadish said.

Asked if North Korea was continuing to develop its long-range Taepodong-2 missile without any flight tests, Gen. Kadish told a group of defense reporters: "All the indications that I see and watch, the answer is yes."

The Defense Intelligence Agency stated in a report made public by the Senate last month that North Korea's 1999 ban on missile flight tests was having "minimal" impact on continued development of the Taepodong-2 (TD-2).

"By precluding flight testing, the moratorium probably would delay deployment of TD-2 missiles as long as it remains in place," the DIA said, noting that the missile could be deployed without a flight test, although it would be unlikely.

"North Korea likely perceives its TD-2 ballistic missile capability primarily as a tool for deterrence and political coercion," the DIA said. "During a conflict, the North also could attempt to strike U.S. and U.S. interests with ballistic missiles, if North Korea's leadership were attacked directly or was facing imminent destruction."

The DIA stated that North Korea had one or two nuclear weapons.

Gen. Kadish said U.S. efforts to defend against threats of missile attack no longer are focused on the former Soviet Union and China but rogue states.

"It's not about the Soviet Union," he said. "It's about North Korea, it's about Iran, it's about Iraq, it's about Libya and other states that might threaten us in the process."

Iran is continuing to test missiles and "they continue to make progress," he said.

Nations that are building missile systems also appear willing to share missile technology, he said.

"They are moving from the capability of having very good systems in short-range missiles, to the intermediate and longer-range missiles that we're seeing," Gen. Kadish said. "And that's the trend."

North Korea, Iran, Iraq and Libya are key missile-developing states of concern against which the United States is preparing to build defenses, he said.

Gen. Kadish said the missile-defense test site being built at Fort Greely, Alaska, is moving ahead and by late 2004 or early 2005 will provide the nation with an emergency defense against a North Korean missile attack.

"Once the test bed is in place, there will be some amount of capability because of its location to handle any threats from North Korea that might arise, but it will be extremely limited," he said.

Five anti-missile interceptors will be deployed at the site.

Gen. Kadish singled out Libya as a state working hard to buy and build long-range missile systems.

"The Libyans have been pretty active in trying to get missile capability," he said. "And not just short range I will say this: They have enough money to buy it."

The Libyans appear to be having problems developing an indigenous missile capability, he said.

The CIA stated in an analysis made public by the Senate Intelligence Committee last month that Libya was "continuing its efforts to obtain ballistic missile-related equipment, materials, technology and expertise from foreign sources."

"Outside assistance is critical to Libya's ballistic missile development programs and may eventually result in Libya achieving its long-desired goal of a [medium-range ballistic missile] capability within a few years."

Gen. Kadish said the administration's withdrawal from the 1972 Anti-Ballistic Missile Treaty has made it easier to design and build missile defenses without the restrictions imposed under the Cold War-era agreement.

"My life got a lot better after the treaty, in terms of our ability to get the job done," he said.

Critics of the Bush administration's withdrawal from the treaty had warned that abrogating the pact would lead to a new arms race and a strategic missile buildup.

Gen. Kadish also said the military should step up purchases of a new Patriot missile system known as PAC-3, the first defense system built from the ground up to counter missiles. Earlier versions of the Patriot were designed as anti-aircraft systems.

"My recommendation has been and will continue to be to buy Patriot-3s as quickly and as fast as we can afford to buy them because they're ready to be bought," he said.

The U.S. military faces missile threats in the Middle East and in Northeast Asia.

Iraq's Scuds and short-range missiles can be countered more effectively today than during the 1991 Persian Gulf war, when Patriots had some success against Scuds, Gen. Kadish said.

The U.S. military and several nations in the Middle East have either a few Patriot PAC-3s or larger numbers of an earlier version known as PAC-2.

Israel is defended by the Arrow missile-defense system.

<http://www.washtimes.com/national/20021101-11616336.htm>

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New York Times
November 1, 2002

U.S. Tested A Nerve Gas In Hawaii

By Thom Shanker

WASHINGTON, Oct. 31 — In the latest release of once-classified reports on chemical warfare tests during the cold war, the Pentagon said today that it detonated artillery shells and rockets filled with deadly Sarin gas in Hawaii in 1967.

There were no reports of military personnel or civilians being exposed to the nerve agent during the tests, conducted in the Upper Waiakea Forest Reserve, a dense rain forest on the island of Hawaii, Pentagon officials said.

Sarin, a highly toxic nerve agent that is absorbed through the nose, mouth, eyes and, to a lesser extent, the skin, can block breathing, dim vision and, in sufficient doses, bring on coma and death.

It dissipates to nondeadly levels after a few hours, Pentagon health officials said. Even so, the Pentagon report said, "very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms."

According to the reports, released today by the Deployment Health Support Directorate, a branch of the Pentagon office of Health Affairs, the Army detonated warheads filled with Sarin in the forest reserve in April and May of 1967.

The goal of the test, named Red Oak, Phase 1, was to "evaluate the effectiveness of Sarin-filled 155-mm artillery projectiles and 115-mm rocket warheads in a tropical jungle environment," the report states.

Barbara Goodno, a spokeswoman for the Deployment Health Support Directorate, said the tests were in a "remote location, far away from any populated area."

The five new studies released today are the latest in a series of declassified reports about the chemical warfare experiments. Pentagon officials said 46 exercises were conducted by the Deseret Test Center, based at Fort Douglas, Utah, from 1962 to 1973. Today's release brings to 41 the number of tests whose reports have been declassified. The tests were not conducted to study the effects of chemical and biological weapons on human health. Instead, those on land were to learn more about how chemical and biological weapons would be affected by climate, environment and other combat conditions. Tests at sea were intended to gauge the vulnerability of warships and how they might respond to attack.

The Defense Department is working with the Department of Veterans Affairs to identify an estimated 5,500 people believed to have participated in the land and sea tests. It is not known whether all the military personnel were fully aware of the nature of the exercises and the potential risks.

The new reports also describe three previously unknown tests that were conducted using less-toxic substances in the Panama Canal Zone, and another in an unspecified jungle location.

CS gas, commonly known as tear gas, was used in the jungle location.

In tests conducted in the Canal Zone, a biological agent called *Bacillus globigii*, in the same family as anthrax, was sprayed to simulate the dispersal of a more lethal biological warfare substance.

At the time, *Bacillus globigii* was considered harmless, but in the intervening years medical experts have determined that it could cause acute infections in people with weakened immune systems.

One series of tests in the Canal Zone, in which *Bacillus globigii* was sprayed by aircraft, was conducted near the Fort Sherman Military Reservation in February and March 1963. In a related series of tests, the substance was exploded from bomblets in Hawaii in April and May 1966.

<http://www.nytimes.com/2002/11/01/politics/01CHEM.html>

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Defense Week Daily Update
October 31, 2002

Army To Take Over PAC-3 Program

By Ann Roosevelt

WASHINGTON--Army Secretary Thomas White said today the Army will soon take over the Patriot PAC-3 antimissile program from the Missile Defense Agency.

His comments came as a Pentagon panel was scheduled to meet today to weigh whether to increase production of the PAC-3, the hit-to-kill version of the Patriot interceptor, ahead of a possible U.S. war with Iraq.

"The PAC-3 program is being transferred back to the Army from the Missile Defense Agency," White said at a morning briefing with reporters at the Pentagon.

In the fiscal 2003 budget, the Defense Department put PAC-3 money in the Army's budget submission, but the recently enacted defense-appropriations law for fiscal 2003 moves the money back to the Missile Defense Agency. Congress had expressed concerns that the service would use the funds for other purposes. The Army's proposed takeover of the program is thus the latest move in a tug of war between the antimissile agency and the services over missile-defense programs.

Meanwhile, at another press breakfast today, Air Force Lt. Gen. Ronald Kadish, director of the Missile Defense Agency, told reporters PAC-3 should be produced in quantity, despite some recent testing setbacks.

"We ought to buy them as rapidly as we can afford to," Kadish said.

The Patriot PAC-3 interceptor impacts hostile missiles directly, rather than using a warhead that explodes close to the threat. That, U.S. officials say, makes PAC-3 more lethal. Earlier Patriot system missiles with exploding warheads were used during the Gulf War to counter Iraqi Scud missiles—with unsatisfactory results.

The Army thinks PAC-3 is a "significant upgrade," to the system, which includes radar and software upgrades and is "enormously effective," White said. "We're fielding the first battalion at [Fort] Bliss, [Texas] of PAC-3."

Today's meeting of the Defense Acquisition Board was supposed to discuss PAC-3 production, schedules and future testing, a Pentagon official said. Reportedly, some military officials want to double production from the current six per month.

Under the current contract with Lockheed Martin Missiles & Fire Control-Dallas, 38 PAC-3 missiles have been delivered. Another 15 are due by the end of the year. And between February 2003 and December 2004, another 126 are to be delivered for a total of 179 under the current low rate production contract, a Pentagon official said.

Raytheon builds the PAC-3 radar and integrates the system.

Speaking on Capitol Hill a week ago, Deputy Defense Secretary Paul Wolfowitz said the department was looking at ways to speed up PAC-3 missile production, "out of concern for near-term vulnerability."

White echoed that today saying the Army is "taking a look at various options for the acceleration of PAC-3."

The accelerated production could prove controversial because the PAC-3 system had several failures in tests earlier this year, including technical glitches that kept the missiles from leaving their launchers in a few cases.

Kadish of the Missile Defense Agency said the glitches were "minor" and "annoying." He called them a problem of "quality of design, of process control and of manufacturing," and he said "everybody had a hand in it."

He didn't know whether any employee or company was penalized for the problems. He said he was focused on preventing a recurrence, not punishing a perpetrator.

--John M. Donnelly contributed to this report.

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Moscow Times
November 1, 2002
Pg. 4

Moscow Presses Pyongyang Over Nukes

By The Associated Press

In a sharp change of course, Russia on Thursday accused North Korea of being insufficiently forthcoming about its alleged nuclear weapons program, while Pyongyang's ambassador to Moscow defended its right to develop nuclear weapons.

The United States said earlier this month that North Korean officials acknowledged they had a nuclear weapons program during talks with visiting U.S. Assistant Secretary of State James Kelly in Pyongyang on Oct. 3-5. U.S. Undersecretary of State John Bolton then traveled to Russia to present officials with evidence of the alleged uranium enrichment program.

Moscow reacted with caution, saying it would like to independently check the information before making any definite conclusions. Deputy Foreign Minister Alexander Losyukov said Moscow had received an explanation from the North Koreans but it was insufficient. "There is some ambiguity in the statements by North Korean representatives," he said. "In our view, such ambiguity is very dangerous because it leads to mutual suspicions and can negatively affect the situation on the Korean peninsula."

Pak Ui Chun, North Korea's Ambassador to Moscow, said Thursday that the U.S. claim that Pyongyang was pursuing nuclear weapons programs were unfounded, Interfax reported.

<http://www.themoscowtimes.com/stories/2002/11/01/014.html>

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Washington Post
November 1, 2002
Pg. 30

U.S. Finds Hurdles In Search For Nonlethal Gas

By Guy Gugliotta, Washington Post Staff Writer

The quest for an effective "nonlethal" chemical agent like the one that killed more than 100 hostages in Moscow last weekend has tantalized U.S. military and law enforcement officials for years.

But even though the government has undertaken several research projects into incapacitating gases and aerosols since the mid-1990s, the effort has proceeded slowly in the face of thus-far insurmountable technical hurdles and concern about violating the 1993 Chemical Weapons Convention.

A Pentagon spokesman this week issued a statement saying "the U.S. military is not currently involved in any programs or research related to the development or procurement of incapacitating agents," did not plan any such research and has not stockpiled any agents.

But as recently as May 2000, the Defense Department paid \$69,931 to a Michigan-based firm to begin a multiphase project "to demonstrate the feasibility of innovative, safe and reliable chemical immobilizing agents."

The first phase of the project was to include animal tests, and the second phase was to include "human volunteer studies." Officials at the Bel Air, Md., office of OptiMetrics, Inc., the contractor, did not respond to telephone inquiries seeking information about the project.

Also in 2000, the Pentagon-funded Applied Research Laboratory at Pennsylvania State University issued a report on incapacitating agents that concluded their development is "both achievable and desirable."

"There was no hard research done, and there has been none done here" on such agents, said Andrew Mazzara, director of the laboratory's Institute for Emerging Defense Technologies. He characterized the study as a review of existing literature on the subject.

Still, Mazzara, a retired Marine colonel who ran the Pentagon's Joint Non-Lethal Weapons Directorate before joining the laboratory in 1999, suggested that "what we saw in Russia almost cries out for more rather than less research into this."

His views clashed sharply with those of Edward Hammond, director of the Austin-based Sunshine Project, a leading opponent of U.S. ventures into nonlethal technology:

"Using chemical weapons, including incapacitating chemical weapons, is a slippery slope," Hammond said. "We've gone down it before, but it seems like we're going down it again."

Next week, the National Academy of Science is scheduled to release "An Assessment of Non-lethal Weapons Science and Technology," which will, in part, evaluate the utility of incapacitating agents. The report was commissioned by the Marine Corps' Joint Non-Lethal Weapons Directorate and the Office of Naval Research.

Advocates and opponents of incapacitating agents agree that the idea is a noble one -- a gas or aerosol that would gently yet immediately render large numbers of people harmlessly unconscious, instantly terminating a hostage crisis or a riot without gunfire, billy clubs or needless violence.

In practice, however, as the Moscow theater debacle showed last weekend, implementing such a remedy is fraught with dangers. When it comes to using these disabling "calmatives," as they known, the margin of error is so narrow as to be nonexistent.

"There is no such thing as a knockout drug," said Alan P. Zelicoff, senior scientist in the Center for National Security and Arms Control, at Sandia National Laboratory. "I can put you down with morphine; I can put you down with valium, I can put you down with barbiturates. But in all cases, I have a high risk of hurting you very badly." Zelicoff said the opioid drug fentanyl, acknowledged by Russian authorities as the basis of the aerosol pumped into the Moscow theater, has an extremely low "therapeutic index" -- the difference between rendering a person unconscious and hurting or killing the person is very small. Anesthesia, Zelicoff said, is "controlled death." This problem -- that anesthesia, relaxants or anti-pain analgesics are highly individualized at high doses -- has never been overcome. Many experts agreed that knocking out a heterogeneous population of several hundred people of all ages, all sizes, both sexes and with some of them sitting close to the vents and others far away, is simply not possible with current technology and should never even be attempted.

"The whole idea of nonlethal chemical warfare agents is a myth," said Elisa Harris, a senior research scholar at the University of Maryland and a former Clinton administration National Security Council official. "Anyone who tries to suggest otherwise is ignoring the evidence."

Discussion of this dilemma pervades government studies of incapacitants. C. Parker Ferguson, a key researcher for the Army in the mid-1990s, acknowledged that "it's a very complex situation -- it's hard enough to use them in the operating room without compounding the problem with larger groups."

Still, the difficulties have not stopped researchers. Ferguson, now working as an independent consultant and contract researcher, is listed as principal investigator for the OptiMetrics contract, which dismisses "previous approaches" to the problem as "deficient in one or more technical aspects." Ferguson said he was no longer connected with the project, and would not describe the results to date.

Opponents of incapacitants suggest not only that the research is a waste of time, but also that the use of the agents undermines the Chemical Weapons Convention in many respects.

"You just know our people are saying, 'What the hell are the Russians up to?'" said the University of Maryland's Harris. "Incidents like that could engender greater efforts not only on our part, but in other countries."

Still, noted Ted Pro Civ, a deputy assistant to the secretary of defense for chemical and biological matters in the Clinton administration, the stakes could be huge in a world where the United States is involved in "police actions" like those in Haiti, Somalia and Bosnia, where large numbers of civilians were involved.

"These rogue countries think nothing of drawing you into a situation where you're surrounded by noncombatants and where you can't kill anybody," said Prociv, president and CEO of the Springfield engineering firm Versar. "You have to have something besides billy clubs and machine guns."

<http://www.washingtonpost.com/wp-dyn/articles/A48722-2002Oct31.html>

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Wall Street Journal
November 1, 2002

U.S. Agency Set To Issue Report On Nonlethal-Weapon Science

By John J. Fialka and Marilyn Chase, Staff Reporters of The Wall Street Journal

WASHINGTON -- The National Academy of Sciences will issue a report next week on the science of "nonlethal weapons," shedding a little light on the often-secret and frequently frustrating quest for chemical agents to safely immobilize terrorists or criminals.

The report's release comes amid mounting concern over the safety of such measures, following last week's gassing of Chechen rebels and hundreds of hostages in a Moscow theater, in which 117 civilians died. The report, which was commissioned by the Pentagon's Joint Non-Lethal Weapons Directorate, is expected to explore the science and safety aspects of the research, likely bringing some experiments into public light for the first time.

William Colglazier, the national academy's executive officer, said many reports of government chemical projects were public before the Sept. 11 terrorist attacks but were then classified by the Defense Department.

One paper released by the academy reveals a 1994 proposal to use "chemical immobilizers" on guinea pigs at the Army's research laboratory in Aberdeen, Md. The report says that previous tests with a drug family, called "alpha-2 adrenergic agonists," could knock out the animals, but warns the agents could still harm children, the elderly and the infirm.

The extent of the U.S. research program, which has been under way at the Pentagon and later at the U.S. Department of Justice, is unknown. A Justice Department spokesman said its "less than lethal" program includes a \$77,000 research project at Penn State University in University Park, Pa., looking at the feasibility of combining a "calmative" drug to mute physical reactions to pepper spray.

Andy Mazzara, a retired Marine colonel who directs the research program at Penn State, and who formerly headed the Joint Non-Lethal Weapons program, says such weapons are "more humane" than conventional deadly force employed during the police rescue of hostages.

Matthew Meselson, a Harvard biologist who has followed the U.S. defense-research program, said such research flourished in the 1970s and 1980s and then disappeared in the early 1990s, just as an international treaty banning chemical weapons came into force. He said the U.S. tried different ways of employing fentanyl, the powerful narcotic painkiller used by the Russians, but "none of this seemed to work very well."

Edward Hammond of the Sunshine Project, an Austin, Texas, nonprofit group opposed to calmative weapons, argues that they are illegal under the Chemical Weapons Convention, as the treaty is known, a position disputed by advocates. He called the Joint Non-Lethal Weapons Directorate the main "cheerleader" for calmatives research. A spokesman for the directorate acknowledged discussions on the topic in 2000, but denies that there is any research now.

Police agencies, however, continue to seek drugs to calm rioters and "enraged" suspects, said Captain Charles "Sid" Heal, commander of the Special Enforcement Bureau of the Los Angeles Sheriff's Department, a founding member of Penn State's Institute of Emerging Defense Technologies.

"Obviously we're interested in nonlethal weapons in general, and calmatives are a component part," said Capt. Heal. "Even Janet Reno said after Waco she just wished she had something to put everyone in the building to sleep."

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National Geographic
November 2002
Pg. 2

Weapons Of Mass Destruction

An ominous new chapter opens on the twentieth century's ugliest legacy

By Lewis M. Simons

You may have missed this:

A month or so before Christmas, three people, most likely male, walked into a crowded shopping mall in Oklahoma City. Dressed as maintenance workers and carrying plant sprayers, they strolled among the holiday shoppers, tending to the potted plants that decorated the gaily lit corridors. A short time later, their work complete, the three walked to mall exits and vanished into the night. At that moment two other teams were doing the same thing at malls in Atlanta and Philadelphia.

At 7 p.m. on December 9, the President of the United States met secretly with his National Security Council—which included the national security advisor, the secretary of defense, and the chairman of the joint chiefs of staff. The President stunned them with his opening remarks: "The Centers for Disease Control (CDC) has confirmed that at least one case of smallpox—and maybe as many as 20—have occurred among civilians in Oklahoma City....

Presumably, this disease has been deliberately introduced and [is] the result of a bioterrorist attack on the United States." As the President spoke, a laboratory in Oklahoma confirmed 20 cases of smallpox and said it suspected 14 more. Nine other cases were reported in Atlanta and seven in Philadelphia.

Federal and state authorities immediately swung into action, and within 24 hours FBI agents were combing the streets of Oklahoma City. At the White House, the deputy secretary of health and human services confirmed that the only two known sources of smallpox were at the CDC's heavily guarded repository in Atlanta and the Vector laboratory outside Novosibirsk, Russia. Intelligence revealed that a former Vector scientist, an expert in smallpox, had left Russia and was believed to be in Iraq.

By the next week, tens of thousands of Americans showing symptoms, or imagining them, were overwhelming hospital emergency rooms. Television news repeatedly ran footage of a tearful mother, toddler in arms, pleading for vaccine as a policeman shoved her back into the crowd.

Meanwhile, chaos swamped those who were trying to manage the crisis. Congress and state legislatures, the FBI and CIA, fire and police departments, the Defense Department and National Guard, public health agencies and private physicians—all lost valuable time and energy in the confusion over procedures and turf.

By December 15, officials had confirmed 2,000 cases in 15 states, with more in Canada, Mexico, and Britain. The death toll had hit 300.

A week later there were 16,000 cases in half the states in the country, and a thousand people had died—200 from reactions to vaccine. Cities were paralyzed as millions tried to flee the epidemic. Vaccine supplies were now exhausted, and violence was rampant in the streets.

Health authorities projected that by February there would be three million cases of smallpox in the United States. One million Americans would be dead, with no end in sight.

GAME OVER.

This doomsday scenario was, in fact, a game, but no one involved was having any fun. It was played in June 2001 around a table at Andrews Air Force Base, outside Washington, D.C. Former U.S. Senator Sam Nunn assumed the role of the President, with other prominent figures playing cabinet members, military leaders, heads of federal agencies, state officials, and journalists. The point of the exercise, code-named Dark Winter, was to see how prepared the United States was to deal with a biological weapons attack.

So how did it go? Soon after the exercise Nunn testified before the U.S. Congress—the real one—on the failures Dark Winter had exposed. The country was critically short of vaccine, Nunn warned. It had not trained top officials, planned a coordinated response, built an adequate public health infrastructure, educated the public or the media, practiced the few plans that were in place, or ranked bioterror as a high national priority. "It's a lucky thing for the United States," said Nunn, "that this was just a test and not a real emergency."

It took a real emergency—September 11 and its aftermath—to turn this exercise from a grim fantasy to a matter of life and death.

Although the airplane attacks on the World Trade Center and the Pentagon showed that almost anything could be used to kill large numbers of people, most of us probably still visualize the nuclear blast, with its signature mushroom cloud, when we think of weapons of mass destruction, or WMD, as national security experts know the genre.

But while some countries are amassing bombs and a few more are working feverishly to acquire their first, the world may have more to fear from other, less familiar means of attack. At one end of the scale are alternative threats ranging from so-called dirty bombs—conventional explosives wrapped in radioactive material—to the click of a cyberterrorist's mouse, hacking into computer systems to attack a nation's water supply, air traffic, energy

infrastructure, financial systems, and communications. At the other end, the most lethal attacks would be caused by traditional nuclear, chemical, and biological weapons.

Around the time that "President" Nunn was grappling with Dark Winter, photographer Lynn Johnson and I set out to report on the threats facing humanity from such weapons. In the many months since, we've traveled to some of the world's darkest and most frightening corners, in Russia, Kazakhstan, Ukraine, Iran, Japan, and the United States. At first we found people barely paying attention, hardly aware that such threats existed. Then came September 11, followed by the discovery of anthrax spores in letters to U.S. politicians and media figures. The sobering lessons of Dark Winter rose to the top of everyone's agenda. Governments scrambled to prepare for, and prevent, the next attack.

In response to these disasters, Lynn and I naively expected that locked gates would be thrown open to us and the searchlights switched on. Instead we found that blackest night had fallen on the tightly guarded world of WMD. Doors were slammed in our faces. Key scientific labs and military installations around the world that had given us the green light before September 11 were suddenly off-limits. Political leaders clammed up. Intelligence agents had better things to do. People we had trusted dealt us lies and misinformation.

Still, we managed to pry open enough doors to gain a clear sense of what humanity is facing in this battle for our collective future. Because of its status as the world's only superpower, the United States is the most obvious target, but the whole world is now on notice: When nations—or terrorists—turn to weapons of mass destruction, no one on Earth is truly safe.

All this comes at a time when the old geopolitical rules seem to have flown out the window. For half a century a titanic clash of superpowers kept nations divided but fairly certain of who had the power to do what and to whom. No more. In many ways the world is more dangerous today than at any time since 1945, when the United States first used a nuclear weapon to bomb Japan into submission and end World War II.

"There is no longer a [single] global conflict," Zinovy Pak, director of the Russian Munitions Agency, told me in Moscow. "But is the world safer? Unfortunately not. Today there are mainly local causes of conflict—social, religious, ethnic, racial. But because of developments in science and technology, there are new ways, new weapons, to resolve these conflicts."

A dozen years after the Cold War finally petered out, the United States and Russia still control most of the world's WMD. Each has enough weaponry to kill every form of life on Earth many times over, if dying more than once were possible.

In the latest round of nuclear arms cuts, Presidents George W. Bush and Vladimir Putin agreed to reduce the number of warheads mounted on missiles and bombers from their current levels of around 6,000 each to no more than 2,200 each by the end of 2012. Few experts believe that either nation would set out to use these weapons against each other—unlike some other members of the WMD club.

In the Middle East it is widely believed that Israel possesses all three categories of WMD, with its enemies Iraq and Iran not far behind. Libya, Syria, and Egypt are involved in chemical and biological programs. South Asia vies with the Middle East as the world's most volatile danger zone. India and Pakistan, who've been staring down the barrel at each other across the lovely and bitterly contested region of Kashmir, are both armed with nuclear weapons. They've fought three conventional wars and narrowly averted another earlier this year. Certainly the next one, or the one after that, could go nuclear.

Elsewhere, North Korea and China are known to possess, or to be developing, one or more types of WMD. And in Europe, France and the United Kingdom bear nuclear arms.

Then there are the freelancers, what the analysts call "non-state actors" (though some are funded and housed by governments), whose willingness to die for their beliefs makes their tactics and their timing utterly unpredictable. If they were to strike, where would they get their weapons?

Russia, because of its vast WMD stocks and economic turmoil, is the most obvious answer. A poor and weak Russia can cause harm in ways that a powerful Soviet Union never did—even as it is voluntarily disarming.

Given Russia's dysfunctional economy, Moscow is in no position to spend millions of dollars on security for its stores of deactivated nuclear warheads, along with the former U.S.S.R.'s decaying production facilities, submarines, and reactors, which hold enough material for thousands of nuclear bombs.

Russian authorities say that since 1991, there have been 23 attempts to steal fissile material from nuclear facilities and Soviet-era stockpiles, which reside at over 40 locations across Russia as well as in former Soviet republics. In 1994 the U.S. government purchased 1,300 pounds of highly enriched uranium from Kazakhstan to get it out of circulation.

Some of the thieves were caught. Others succeeded in smuggling small quantities of weapons-grade material out of the country, leading U.S. intelligence officials to speculate that enough material for a nuclear bomb has already left

Russia. Also of grave concern are the unknown quantities that went missing or unaccounted for as the Soviet bureaucracy unraveled.

The U.S. Defense Threat Reduction Agency (DTRA) and the Department of Energy have launched programs to dispose of such material and to update security at former Soviet facilities, and U.S. lawmakers recently increased funding for their efforts. But even with U.S.-supplied razor wire and TV monitors, Russian WMD sites are subject to the whims of underpaid scientists and soldiers who have been stripped of their former prestige and dignity.

While the world puts Russia under the microscope, it's hardly the only source of tools for terrorists. In the United States, as well as in other advanced nations, chemical plants, biological labs, food irradiation plants, medical x-ray facilities, and nuclear reactors and waste repositories are all potential suppliers.

In 1998 three Greenpeace activists boarded a British-flagged freighter carrying a cargo of highly radioactive nuclear waste as it approached the Panama Canal en route to Japan. Greenpeace meant to protest the environmental hazards of shipping nuclear materials, but it amply demonstrated how easily terrorists could hijack such deadly cargo.

International treaties designed to exercise at least some limited control over WMD have been in place for decades, with varying degrees of effectiveness. (Citing those failures, the Bush Administration has pulled the United States out of international nuclear agreements and criticized existing biological and chemical treaties, to the consternation of its allies.)

Russian munitions chief Pak's specific task, under the Chemical Weapons Convention, is to destroy 44,000 tons of Soviet chemical agents. He notes that both Russia and the U.S. are already years behind schedule on meeting the 2007 deadline imposed by the convention for destroying chemical stockpiles.

Some experts are skeptical about the potency of chemical weapons, which can be rendered ineffective by heavy wind or rain. But don't tell that to the Iranian war veterans I talked to, whose health was ruined by Saddam Hussein's poison gas attacks in the 1980s, or to the Kurdish villagers I interviewed who watched their families die agonizing deaths in similar attacks. And don't tell it to Yoshiyuki Kouno, whose wife, Sumiko, has been in a vegetative state since she inhaled sarin gas released by the Aum Shinrikyo cult near her home in Matsumoto, Japan. Although Zinovy Pak's days are spent dealing with chemical weapons, his "worst nightmare" has nothing to do with toxic gas. It's about biological weapons—the microscopic killers that epitomize terror, such as the smallpox "released" in *Dark Winter*.

In most cases, going nuclear requires a massive financial commitment: Components and expertise are hard to acquire, and facilities are necessarily large and, so, easily identified. Chemicals are hard to control and often poison those who use them. But a biological weapon can be made cheaply in a small building, even in the back of a truck, and transported with ease.

William C. Patrick should know. He directed product development for the U.S. Army's offensive bioweapons program until 1969, when the U.S. stopped producing these weapons. As Patrick points out, he can carry all the biological agent needed to wipe out a city without setting off a single alarm. Addressing New York City firefighters in Brooklyn just weeks before September 11, the grandfatherly Patrick opened a brown attaché case and pulled out bottles of simulated anthrax and smallpox.

"I carried this through airport security in Baltimore and La Guardia this morning," Patrick announced. "Not once was I asked to open this bag."

For these reasons and others, biological warfare is particularly appealing to less-developed nations and to terrorists. When the day comes that one of these players uses such a weapon, say the experts who are paid to guess such things, the dead will be counted in the tens or hundreds of thousands—especially if the agent is smallpox or some form of plague.

"While anthrax is relatively accessible to terrorists, anthrax isn't contagious," said D.A. Henderson, leader of the World Health Organization program credited with finally eradicating smallpox worldwide in 1980. "Smallpox is. There's some evidence that smallpox may already have been transported out of Russia to the Middle East, possibly to Iran or Iraq, and maybe even North Korea. If smallpox was released by these or any other countries, we'd be looking at a global catastrophe."

How a bioweapon would arrive is a matter of conjecture. Perhaps it would come by way of an air-conditioning system at a convention center in Berlin, at a soccer game in Rome, or in a midwestern shopping mall, as in *Dark Winter*. The container could be left at rush hour on the track of a Paris Metro station to be crushed beneath the wheels of an arriving train. Or the targets need not be human at all. Pathogens that kill food crops or livestock could be sprayed over a Japanese rice field or a grazing cattle herd in Argentina. The only sure bet is that it will be done quietly, in what the experts term a "silent release."

A great irony in the remarkable biological research being done today is that much of the work intended to improve and prolong human life can, with minimal effort, be turned into the most horrendous means of ending it. By

manipulating genetic material, researchers can produce vaccines and treat life-threatening diseases like cancer. Genes can also be altered to produce a new strain of anthrax, against which no one has protection. Commercial culture collections around the world—including in the United States—offer menus of biological agents for sale. The customers in nearly all cases are legitimate scientists working on biomedical research. But one rogue scientist, ordering by mail, could transform this material into a biological weapon.

Then there are the deadly germs kept alive in the cold-storage laboratories Lynn and I toured in the former Soviet Union. While Zinovy Pak says he stays awake at night worrying about security at American biotech labs, U.S. officials say they have nightmares about what's happening in the places we visited. I certainly do.

At one of these sites in Kazakhstan, we found doors to labs and refrigerators secured with dirty string and blobs of wax. We saw glass vials of plague bacteria stored in a metal can still bearing its original paper label, "peas," inside a refrigerator you'd have found in grandma's kitchen 50 years ago. If I'd tried to walk out with a vial, I'm sure I would have been stopped or arrested. But what if I worked in the lab or had the money to buy my way past trouble? At the height of the Cold War, the Soviet biological weapons program employed some 60,000 workers in more than 50 locations. Scientists in Russia and Kazakhstan, where most Soviet labs were located, assured us that all such installations had been destroyed. U.S. intelligence sources, barred from many of the sites, can't confirm this. But even if all the biological agents in the Soviet—or U.S.—stockpiles were destroyed, we'd still have plenty to worry about.

"The important thing is the recipes that remain in the minds of the scientists who developed them and the engineers who weaponized them," said Brian Hayes, a retired U.S. Army Special Forces major, who now inspects Soviet weapons sites for DTRA, as we traveled together in Kazakhstan. The United States considers more than 700 former Soviet weapons scientists to be security risks.

In Russia, as well as in the former Soviet republics of Ukraine and Kazakhstan, I asked repeatedly if anyone knew of scientists or engineers who'd gone abroad to work. Several people said they'd heard of this one or that who'd taken a job in the United States. But Iran? Iraq? North Korea? No. How about Syria, Sudan, Libya? No, no one. "You must remember," said Zinovy Pak, "we're next door to Iran and Iraq. Why would we want them armed with weapons of mass destruction?"

Among my fellow guests at a Tehran hotel recently was a group of 11 Russians. Neatly dressed, soft-spoken, they were there when I arrived and still there when I departed two weeks later. Each morning a white van picked them up, and each afternoon it returned them. They ate all their meals together. One evening I approached their table and introduced myself. What, I asked, are you folks doing here? "Teaching," replied a gray-haired man in an open-collared shirt. Ah. Teaching what? "Engineering." Then they excused themselves.

When I pursued this with Dr. Asad Ardalan, head of Iran's Center for Legal and International Studies, his response was equally simple: "That assistance is for our nuclear energy program. It has nothing to do with weapons."

In that case, I asked, what about dualpurpose technology? Couldn't the information and expertise being supplied by these Russians for peaceful purposes also be used to build weapons? His response was, I thought, a classic of its kind—evasive, certainly, but not untruthful. "You may use a knife to peel a piece of fruit or to kill someone. So if I have a knife in my hand, what does it mean? It depends on the observer's point of view."

At Stepnogorsk about 20 years ago, the Soviet military flung up a huge bio-weapons factory on the Kazakh steppe in violation of the Biological Weapons Convention, which the Soviet Union had signed in 1972, joining the United States and more than a hundred other nations. On the site today, Yuriy Rufov is the director of an enterprise called Biomedpreparat, which is a big name for a little company. Except for Rufov and a few aides, huddling in their coats in a bare, unheated office building the subzero morning we visited, Biomedpreparat doesn't exist. It has no factory, no machinery, no laboratories.

In the Soviet era, Stepnogorsk was a "secret city," one of 30 or so locations that did not appear on maps, and the plant, part of the Soviet biotechnology program known as Biopreparat, manufactured anthrax for the military. Since 1996 the United States has spent 2.5 million dollars to turn most of the vast plant into rubble. Washington also agreed to help Biomedpreparat convert what remains into a pharmaceuticals factory and get the former staff back to work. That hasn't happened, to Rufov's frustration.

Rufov insisted that he and his colleagues wouldn't easily offer their services to other governments. "We were all educated to believe in the rightfulness of the Soviet Union and the Communist Party. Going to work in the Middle East would go against everything we spent most of our lives believing in."

Yet thousands of those who were the Soviet Union's elite—granted the best of salaries, housing, food, schools, free vacations on the Black Sea, and other privileges that the state could offer—are today unemployed and barely able to put bread on the table. It doesn't take much imagination to realize that some of them, no matter how loyal or patriotic, could eventually be forced to sell what they know.

Of the 680 scientists and technicians who worked at the Stepnogorsk plant in its final days, said Rufov, 500 accompanied the departing Red Army to Russia; 112 remained in Stepnogorsk, paid by the United States to dismantle the plant; 16 were engaged in monitoring contamination of the ruins, also on the U.S. payroll; and 52 were working for a new medical manufacturing company nearby. According to Rufov, only a few former employees have ever gone to work abroad. Chief among them was Stepnogorsk's onetime director, a Kazakh named Kanatjan Alibekov.

A Soviet army physician and biologist, Alibekov fled to the United States in 1992 and filled the government's ear with chilling stories about the Soviet bioweapons program. His crowning achievement had been the perfection of Anthrax 836, the U.S.S.R.'s most powerful weapons-grade anthrax, four times more deadly than its predecessor. Made operational in 1987, it is an extremely fine, silky, grayish brown powder that can drift invisibly for miles. Today, his name Americanized to Ken Alibek, he is chief scientist at a biodefense company in northern Virginia, as well as a professor of microbiology at a local university. The day I visited Alibek in his office, he looked like most American academics, wearing a black turtleneck and skimming a research grant application.

As eventually happens to some defectors, Alibek has been chided by his former CIA handlers for exaggerating information in an attempt to enhance his value. Yet when I asked him about former Soviet bioweaponeers now working abroad, his reply was matter-of-fact.

"Most are in Russia," he said in heavily accented English. "Some are here in the U.S.; a few are in Europe and Asia. There may be a couple in Iran, but if so, we're not talking big numbers. Very few." But, he added, "A few is all it takes."

If, in fact, unemployed former Soviet specialists are giving in to temptation, Russians charge that Americans must accept a piece of the blame. "The Americans were in a great hurry to destroy," Rufov said bitterly as he showed Lynn and me Alibek's old facility back in Kazakhstan. "But now that it's time to rebuild, they're dragging their feet. Our people can't wait much longer."

Rufov led us through the ruins of the former anthrax factory—ten sprawling, white, concrete buildings on the scale of a Detroit auto plant. First we pulled disposable white coveralls and respirators over our parkas, since there still could be faint traces of anthrax inside.

"The construction is extraordinary," Rufov said, pride evident in his deep voice, as we climbed the stairs of Building 221, the main structure, a hundred feet high and two football fields long. We stepped gingerly around shattered beakers, yellowed magazines and safety manuals, and drained vodka bottles.

"No government could afford this today," said Rufov. "Of course, 90 percent of Soviet industry was connected with the military. That's what led to the collapse of the Soviet Union."

On the top level I walked into Alibek's old office. The mandatory Soviet-era portrait of Lenin was gone from the wall, and so was the glass in the windows. A bird lay dead on the floor, frozen solid.

The plant's 5,000-gallon fermenting tanks, all ten of them, had been removed, decontaminated, and destroyed. Left behind were gaping holes in the concrete. Laborers in felt boots trundled out heavy valves and pipes. In a former life they were biologists. "The change has been so radical for them," said Rufov. "They're suffering. We all are."

In Washington former Senator Nunn is sympathetic. "The human side of reducing the WMD threat has been the least tended to and the least successful, but it's also the most difficult," said Nunn, who now heads the Nuclear Threat Initiative, a charitable organization he co-founded with fellow Georgian Ted Turner. Although the United States contributes to keeping 30,000 former Soviet scientists financially afloat, some members of Congress believe they're being asked to bankroll the Russian military.

"They think that the Russians are still working on new weapons," said Nunn, "and by relieving pressure on another part of their economy we'd in effect be paying them to expand their military."

They're wrong, says Nunn. "The homeland defense of the United States begins in the former Soviet Union. And any member of the Congress who doesn't understand that, especially since 9/11, well, I just don't get it."

After a year's worth of finger-pointing and a historic reordering of national priorities, many uncertainties remain about how much the United States—or any society—can do to protect itself from WMD. Beyond giving intelligence and law enforcement agencies new equipment and new powers, tightening security at our borders, training hospital staffs for outbreaks, and building vaccine stocks—all belatedly under way—almost nothing can be done to prevent a biological weapons attack. So what else can we do?

Dr. Margaret Hamburg, a former public health commissioner for New York City who now directs biological programs for the Nuclear Threat Initiative, advocates moving forward at full speed.

"We need to improve intelligence on bioweapons by enlisting medical and scientific experts in the effort, and we need to improve security in our research labs. We also have to prepare for the worst by strengthening the public health infrastructure—educating health care providers to recognize unusual diseases, and upgrading our health care system to respond to a mass-casualty event. If we were attacked today, our system would still be overwhelmed."

As part of what Hamburg describes as "the good news," the Bush Administration is calling on Congress to approve the largest public health budget in history, including the acquisition of enough smallpox vaccine by 2003 to inoculate all Americans if needed.

Even these dramatic steps may not protect the United States, or any nation, from the full weight of the terror in bioterrorism. Americans learned a year ago that a few anthrax spores, or even a spoonful of talcum powder, sprinkled in an envelope can do a huge amount of damage.

Only five people died from the genuine article, which they inhaled from mailed envelopes. Yet Washington, D.C., and other East Coast cities were thrown into high anxiety. Military surplus shops reported a run on gas masks—none of which would have been effective unless the buyers put them on immediately and kept them on 24 hours a day until the all-clear was sounded. "Unlike with nukes, not even an actual event is needed," a federal intelligence expert said of the anthrax scare. "Just a simple hoax, and you can have mass panic and economic upheaval."

While the world watches its most likely target, the United States, mobilize to deal with this new threat—hoping that the long night will never come—many in the antiterrorism field are disconsolate.

"Because we've had what appears to be a quick, high-tech victory in Afghanistan, we're back to putting our faith in technology as the quick fix," the intelligence source told me. "But gadgets like bio and chem sensors are only one tool in your kit. If I'm your adversary, I know you have sensors and I'll find a way to defeat them. We still haven't learned the hard lesson—that we're no longer different from the rest of the world."

Nor does the rest of the world seem to have learned its own lessons. Those who've survived attacks, experiments, and accidents—in the former Soviet Union, in Japan, in Iran and Iraq—are scorned and ignored. It's as if the things that they talk about are just too terrible to hear.

Certainly, as Lynn and I traveled the world on this assignment, there were times when what we saw and heard became unbearable: the freakish human fetuses preserved in jars of formaldehyde in Kazakhstan; the Utah down-winder riddled with cancer; the middle-aged Russian brothers with the minds of infants.

In Iran, for example, there's Sasan Safavian. Gaunt and fragile, he speaks with great difficulty, his words choked off again and again by a cough that forces claws of pain deep into his chest. Propped on a cushion against the wall of his Tehran apartment, he holds a bony hand to the faint sunlight filtering through a curtained window to shield his sensitive eyes. In the past 18 months he has lost 40 pounds. Safavian began dying in 1983 when, as a 16-year-old ambulance volunteer, he was caught not once but twice in Iraqi poison gas attacks.

"Frogs and birds were lying dead all over the ground.... My throat was bleeding, and blood-filled blisters appeared all over my body.... We had no gas masks, and we hadn't been trained. We didn't believe one Muslim country could use chemical weapons against other Muslims."

In Russia 80-year-old Olga Vyatkina leans heavily on a cane, staring dry-eyed at the snow-banked gravestone where she buried her only child, Alexander, in 1979. He was 27. Alexander was one of 68 known victims of the world's worst outbreak of inhalational anthrax. He collapsed on the street a few blocks from Compound 19, in the city of Sverdlovsk, where the Soviet Army secretly produced anthrax as part of the U.S.S.R's vast bioweapons program. "They wrote 'sepsis' on the death certificate. Then we heard rumors that it had been anthrax. My husband and I were terribly afraid. Our son had spent the night before he died at home with us. The people in the morgue refused to dress the body, so we did it ourselves. To this day, no one has ever told us that anthrax killed him. They gave us 40 rubles, and I used it to buy a dress for the funeral."

And in the United States there's Preston Truman, who began chemotherapy and radiation therapy for lymphoma as a teenager. Today, at 50, he suffers from a collection of excruciating diseases, which he mocks as "moans, groans, stones, and bones." At his tiny farmhouse in Idaho, Truman's earliest memory is of a morning in 1955. It was in Enterprise, Utah, and he was three, sitting on his father's knee before dawn. Together they watched the sky explode. A nuclear bomb test had gone off 100 miles upwind at the Nevada Test Site. Many more were to follow.

"Later on I remember people talking mysteriously about all the cancer in town: Did it come from drinking too much soda pop? You know, that kind of thing. Guess they just couldn't believe that their own government would do this to them. And then lie about it. I mean, hell, this is the United States."

These far-flung people, who've never met, never heard of each other, share a relationship none wants. They're victims of weapons of mass destruction. And like Truman, they've all been lied to—still are—by the institutions they were taught to trust. "The minute a government crosses the threshold and goes nuclear, it has to start lying," said Truman. Or crosses the line into any kind of WMD.

After ignoring him for four decades, the United States finally acknowledged that it made Truman and others sick, although the compensation it offered would cover only a fraction of their medical expenses. The Russian government still denies that Olga Vyatkina's son breathed in deadly anthrax spores released from Compound 19. And the government of Iran gives Sasan Safavian inhalers and bags of pills, even though there is no cure for the damage Iraqi chemicals inflicted on his body.

What goes for these three victims applies to tens of thousands more: the hibakusha, or atomic bomb victims, of Japan; the Agent Orange victims of Vietnam; the Kurdish poison gas victims of Halabjah in northern Iraq; the ill-informed test site workers and the residents of quiet neighborhoods downwind from those sites whom we met in Kazakhstan and in Utah.

It even applies to the unafflicted. My wife was outside Tokyo's Kamiyacho subway station in 1995, when the Aum Shinrikyo cult released sarin gas on the train she usually rode to work. She walked away unharmed, but it's never far from our minds. On September 11 we lost a friend in the World Trade Center; another was killed at the Pentagon. Many people reading these words have similar stories to tell. Even those who haven't lost someone can't stop thinking about it. In a very real sense, whenever weapons of mass death are unleashed, all humanity is downwind. In September 1957, on the day Preston Truman started kindergarten, the teacher passed out pocket-size booklets prepared by the U.S. Atomic Energy Commission to assure the children and their parents that all was well. A cartoon shows a bowlegged cowboy holding a Geiger counter going "click, click, click." Over the cowboy's ten-gallon hat is a giant question mark—just like the one that floats over all of us these days, roiling our thoughts with vague FBI terrorist warnings, prompting prayers that a real Dark Winter is not about to descend. "We can expect many reports that Geiger counters were going crazy here today," says Truman's atomic booklet. "Reports like this may worry people unnecessarily. Don't let them bother you." If only that were possible.

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Wired

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Stopping Loose Nukes

Prevention is a game of odds, not certainty.

By Steven Johnson

I'm standing near a row of deserted loading docks in Billerica, Massachusetts, and George Kinsella hands me a vial of cesium 137. "This," he says, "is the kind of radioactive material you might see in a dirty bomb."

As radioactive substances go, cesium 137 leads a fairly innocuous existence as a component of industrial instruments such as moisture gauges. Mishandled, though, it can cause severe burns or genetic defects, as it did at Chernobyl. I hand the vial back, fighting the urge to wash my hands, and Kinsella places it inside the trunk of a Mercedes sedan.

Then he shows me a black canister the size of a soup can: Wrapped in a shielding layer of tungsten, it contains cobalt 57. He climbs into a cargo container on the back of a flatbed truck and puts the canister down near the center. The whole exchange looks like the kind of transaction that keeps Tom Ridge awake at night. As it happens, the loading docks belong to American Science and Engineering, the company where Kinsella works as principal software engineer, and he's preparing to demonstrate its MobileSearch X-ray and radiation sensor technology. For the past decade, the 44-year-old firm has developed X-ray scanners that help customs officials detect contraband in the war on drugs; now it's one of a handful of companies racing to manufacture devices that detect nuclear and radiological weapons.

Kinsella and AS&E chief technology officer Joseph Callerame usher me into an RV-like vehicle parked alongside the Mercedes and the truck. We climb into a small, air-conditioned space where two swivel chairs sit in front of a console outfitted with four monitors and a bank of flashing lights. It looks like the control room of a small TV station. Kinsella takes a seat, and Callerame and I stand behind him.

"Should we start the scan?" Kinsella asks. He makes a few quick keystrokes, and a low rumbling sound begins. A robotic arm mounted on top of our vehicle hangs near the far side of the Mercedes, then begins to slowly creep alongside it. "We're almost starting to cross the cargo now," Kinsella says. "Here we go." A ghostly outline of the trunk scrolls into view on two of the screens. One image is an ordinary X ray, a blurred jumble of superimposed shapes with no apparent depth. The second image, using more advanced backscatter X-ray technology, has an unearthly quality, as though the side of the car was ripped off and a grainy black-and-white image was taken of the contents.

I'm so transfixed by the shot of the Mercedes, I don't notice the rainbow stripe that appears beneath the outline of the trunk, shifting from green to bright red as the scan continues. "It's already detected the radiation," Callerame says. "Green indicates something's there, red is more serious. Even this very small source reveals a potential danger. And you can see that the source is localized to the back of the vehicle." As Callerame talks, the scanner moves past the

Mercedes on to the flatbed. Suddenly there's a steady beeping in the room. "When the threat is higher, that alarm goes off."

Once we're outside again, I glance back at the MobileSearch truck, glaring white in the early afternoon sun. From 20 feet away, it looks like the kind of trailer you might see at a construction site. But it's also an early glimpse of a technology that could be seriously effective at reducing a certain kind of threat. Which would be a good thing, because as dangers go, this one is about as gruesome as it gets.

Imagine a terrorist driving east toward Washington, DC, a few minutes outside the Beltway on River Road. In the back of his van, he has 100 curies worth of cesium — about a thousand times what Kinsella handed me — along with a traditional explosive nearly as powerful as what Timothy McVeigh detonated in Oklahoma City. He's 14 miles from the White House. If he makes it there, he could perpetrate an assault on the US more disruptive than the terror of September 11. A strategically placed explosion might kill hundreds and require thousands to be treated for radiation exposure. The cleanup would take months. If he were carrying a traditional nuke — the smallest of which is about the size of a large refrigerator — he could well execute the single most devastating strike in human history. An atomic blast near the Capitol would vaporize everything in downtown DC. A zone framed by Georgetown and southeast Washington would suffer casualty rates of 98 percent. Three or four miles away — out to upper-northwest Washington, out to Reagan Airport across the Potomac — the casualty rate would run 50 percent, with most buildings damaged beyond recognition. The fallout would leave a trail of radiation sickness and, eventually, birth defects.

A dirty bomb set off on the Beltway, or on the outskirts of any city, would be a disaster. But depending on the traffic and the road, it's likely that casualties from the explosion would be minimal and no one would die from radiation poisoning. The cost in life, disruption, and dollars might be the equivalent of a minor earthquake or a bad flood. A catastrophe, to be sure, yet nothing compared with the chaos that would ensue if such a device exploded in a crowded urban center.

In terms of an actual multi-kiloton nuke, the difference between a detonation on the Beltway and a detonation in front of the White House would be several orders of magnitude. In the Beltway blast, thousands would die and millions might suffer from the fallout effects. Park the bomb by the White House, however, and a million people could be killed in seconds. And much of the US government would be taken out in the process.

Right now, the government is focusing its resources on preventing that terrorist from getting his hands on a weapon of this scale. But how realistic is that? There are 30,000 nuclear weapons in the world, plus countless supplies of radioactive material that could be made into a dirty bomb, which spreads its poison with a conventional explosion. We live in the age of the "super-empowered angry young man," in Thomas Friedman's phrase, and any disgruntled group on the planet is a potential radiological event waiting to happen. No matter how hard you try to assuage or attack such groups, the odds are against you. So it's prudent not only to keep potential bomb detonators away from bombs but also to keep bombs away from large groups of potential victims.

We need to make sure that van stays 14 miles away from the Capitol. And the way to do this isn't with Star Wars technology — death rays beaming down from space. We need an older technology, as old as cities themselves. We're talking about a wall.

Walls have protected cities as long as there have been cities to protect. To guard against invasion, Nebuchadnezzar built a network of brick walls so that "the evil and the wicked might not oppress Babylon." As weapons evolved, walls had to change with them. By the 16th century, artillery had advanced to the point that Vienna razed the scattered developments outside city walls so potential invaders would have nothing to hide behind. The battlements had become a broad detection zone. The width of the space created was 400 meters - the range of cannons at the time. The outline of that zone is still visible today in the avenues and parks that make up Vienna's fabled Ringstrasse.

Airplanes and missiles rendered the city wall symbolic; these days, the important defensive barriers aren't physical fortifications. But the advent of small nuclear weapons and dirty bombs — deliverable not by missiles and planes but by trucks and vans — suggest a new kind of urban perimeter defense, an atomic wall. Set up not as an actual barrier but as a vast array of sensors, such a technology would exploit the fact that any radiological or nuclear weapon leaves a footprint. For example, a ring of radiation detection devices deployed along the Beltway could scan every road, alley, and rail line that brings people within 14 miles of the White House. If nuclear material crossed the line, sensors would alert emergency response teams, which would intercept the vehicle before it entered the city. As in Vienna, the wall would be less a barricade that couldn't be crossed than a zone under constant surveillance.

The basic technology behind such a system already exists, and while senior law enforcement and intelligence officials wouldn't discuss the subject on the record, conversations with both government and private-sector experts indicate a high level of interest in such a system. This past August, the Department of Defense announced that bioweapons sensors would be deployed in certain cities. Three months before that, the House began discussing the

Anti-Nuclear Terrorism Prevention Act of 2002, which authorizes \$250 million for installing scanning devices in New York City ports and tollbooths. Really, that's just a first step. "The idea of a truck containing a nuclear device in the center of our city is terrifying, but not impossible," says Senator Charles Schumer, the New York Democrat who proposed the bill. "It doesn't matter how good our airport security is if all it takes to bring a nuclear device right into midtown is putting it on a ship or bringing it in on a truck."

When it comes to Manhattan, Schumer has it relatively easy: He has only four tunnels and 11 bridges to worry about. What about the cities that don't happen to be located on islands? Any terrorist group well organized enough to plot a hijacking could find dozens of back roads into Los Angeles. How much would it cost to scan all the entrances to a city of that size?

"To track vehicles traveling along a highway, what you'd need is a sensor array, and probably a secondary array — along with some video technology to keep track of who you were scanning," says Jim Winso, vice president of the San Diego-based SAIC (Science Applications International Corporation). The company is developing a radiation detection array — SAIC calls it a nuclear portal — that could cost less than \$100,000 when purchased in bulk. The device would scan for suspicious cargo without slowing down traffic; once law enforcement identified an undocumented radiation source, they'd shut off the flow of vehicles at that particular access point, which would require roadblocks that could be set up in a matter of seconds. Once the vehicles in question had been contained, they would be examined with a more elaborate device — something like AS&E's \$2 million MobileSearch system, which combines gamma ray detectors with advanced X-ray technologies.

So when the terrorist heading toward the center of DC drives up the Beltway entrance ramp, his van would travel under a passive scanning device mounted on an overpass. If you remember high school physics, you know that radioactive materials emit invisible particles, including alpha and beta particles, which can be easily shielded against traditional scanners; most also emit gamma rays, which penetrate most materials and are far more difficult to conceal. In the split second he was under the scanner, 500 gamma rays might collide with it. Someone monitoring incoming data would notice the spike in radiation, and a video camera — the kind already used to catch traffic violators — would record his vehicle and license plate.

Within seconds, an emergency management team puts up a roadblock, slowing traffic to a standstill. A rapid-response team locates the vehicle and either searches it by hand or brings in a mobile X-ray unit to survey the contents. Of course, if the signature had suggested a less lethal material, the authorities could have opted to discreetly pull over the vehicle, as though they were nabbing someone for speeding.

An array for each of the 50 Beltway on-ramps, plus 400 more to cover the roads running under the Beltway, would cost \$50 million. Twenty-five MobileSearch trucks that could be moved to a scanning zone in a matter of minutes would cost another \$50 million. Throw in a final \$50 million to build temporary barricades and reconfigure roadways for the system. Then assume that everything ends up costing four times as much: The final tab for a metropolitan atomic wall would be \$600 million.

That's a lot. But keep in mind that the Bush administration asked Congress for \$8 billion for research into Star Wars-style technology, out of a proposed total military budget of \$379 billion. In other words, for the portion of the 2003 budget allocated for missile shields, you could build atomic walls around the dozen biggest cities in the US.

"Every year there are about 300 cases of radiological materials that are either lost, stolen, or abandoned," says Ralph James.

In his office at Long Island's Brookhaven National Laboratory, where he serves as associate laboratory director for energy, environment, and national security, James is telling me how an atomic wall might work in practice. There's a measured, Mr. Rogers quality to his speech that, along with his defense industry euphemisms, creates a false sense of normality. He mentions "consequence management" a few times before I realize he's describing what needs to be done after a nuclear bomb goes off.

To James, the key technology behind an atomic wall is the ability to differentiate between types of radioactive materials. If a source is sending out enough gamma rays, an ordinary handheld Geiger counter will pick that up. But you won't be able to identify the substance without a more sensitive detector. "You can think of gamma ray energies as frequencies," James tells me, as we sit in his office decorated with plaques and honorary degrees accumulated over 30 years. "Just as you can tune your radio to go from one frequency to another, you can tune the sensors to different gamma ray energies."

The gamma rays emitted by the terrorist driving toward Washington, for example, would register energies of 662 kiloelectronvolts. That energy profile would create a clear picture: cesium 137, and probably a lot of it. Definitely not the kind of material you'd normally see packed into the back of a van.

In general, detecting radiation is easy. The hard part is separating it from all the other radiation out there. "We have very sensitive detectors available — we can fly airplanes over the ground and pick up small increases in natural radiation from uranium ore deposits," says William Miller, professor of nuclear engineering at the University of

Missouri. "But there's considerable variability in natural radiation levels. The presence of radon gas in homes and basements was discovered because a nuclear power plant employee kept setting off alarms at work." Potassium decays in every human body, and anyone being treated with nuclear medicine would trigger a crude Geiger counter. Without more advanced sensors, an atomic wall would be a nightmare of nonstop false positives. You'd know there was something spitting out gamma rays — just not what it was.

"It's like good and bad cholesterol," says SAIC's Winso. "You have 'good' radiation, and you have undocumented radiation." James and Winso believe that, in addition to screening out background noise, the system would need to keep track of known radiation sources — hospitals, for example — in an evolving database. That same database would monitor information transmitted by mobile sensors. "We'd need a type of sensor network within the city — to disperse radiation detectors into a continuous monitoring set of stations," James explains. "We can make these things very low-cost. They're not going to be very smart sensors, but they could be no bigger than a wristwatch, distributed to police officers, firefighters, postal workers — enough people dispersed around the city so that it would be difficult to move radiological material around it. All these low-cost sensors could be connected to a network — if you saw a lot of them going off, that's when you'd need to respond."

On its own, each of these sensors would not be very sophisticated. "If we're looking at a radioactive source that's in the building across the street," James says, gesturing at a one-story lab about 40 feet away, "and I have a detector that's the size of a pinhead, it's not going to have very many gamma rays impinging on it in the period of, say, 100 seconds."

James believes you can get around those limitations by thinking of the sensors as small pieces, loosely joined — an atomic wall that functions as a web. "As you get farther away from a source, the sensors have to get bigger, because that radiation is spreading everywhere. So you want to be close. Now you reach a point where you don't win by making these sensors bigger and more expensive by tiling them together. You win by having smaller, less-expensive detectors that are connected to a network." Any given wristwatch sensor might fail to detect a radioactive source, but distribute enough of them in a detection zone, and you'll start seeing a pattern of gamma rays trailing across the city. James calls it a "radioactive plume."

Think back to the terrorist driving toward Washington. In the five minutes before he approaches the Beltway on-ramp, he drives by two police cars, one postal vehicle, and one fire truck, all of which are outfitted with Ralph James' wireless microsensors. Gamma rays set off two of the sensors, and the signals produce a discernible plume headed along River Road. Even this small amount would likely register as cesium 137, though not whether it was enough for a bomb. But emergency-response teams would know to watch out for something emitting gamma radiation heading east on River Road, even before the terrorist hit the Beltway.

An atomic wall naturally brings to mind the Star Wars missile shield proposed during the Reagan administration. But the widely held objection to the Strategic Defense Initiative — that it would threaten the deadlock of mutually assured destruction and thereby make one side more likely to pull the trigger — of course does not apply. As September 11 made all too clear, mutually assured destruction wouldn't be much of a deterrent to our man with the cesium 137. Game theory has always had trouble accounting for players with no rational self-interest, and nuclear deterrence is no exception.

In fact, the irrelevance of MAD creates an opportunity. There's a potential cost and inconvenience to building perimeter defenses, but there's no longer any new danger posed by creating them. It really comes down to how much risk you think there is. There's quite a bit of inconvenience at airports already; if urban residents truly felt that radiation warfare was a legitimate threat in their hometowns, it's not hard to imagine them putting up with longer lines at the city limits. And cost? Spread over its 20-year lifetime, even the most advanced system would be a rounding error in the military budget.

Then there's the more pressing issue: How easy would it be to subvert the network? After the scanning demo in Massachusetts, I sit down in a conference room with Callerame, and he walks me through the physics of concealment. High atomic-weight materials like lead can block gamma radiation, but the large quantities of lead that would be needed would show up on other scanning devices. Callerame's solution is to combine radiation sensors with advanced X-ray technologies, like the backscatter system that produced the startling image of the Mercedes. "I still think you're going to have to X-ray these things," Callerame says. "If you run only a radiation detector and somebody shields their source well enough, you may not pick it up. On the other hand, if you're simultaneously doing X-ray imaging, you'll see this big blob in the middle of the cargo, which would be a dead giveaway of something being clandestinely brought in." He shows me printouts of scans done at a demo in Washington, where they concealed the radioactive material in a container of lead the size of a bowling ball. In the image, the lead container pops out immediately, a bright-white circular shape in the middle of translucent grays. "Now, I should mention, even though we wrapped the cesium in this lead casing, we still managed to pick up the gamma radiation. It's just easier when you do the two in combination."

Experts agree that a mixed-sensor approach is the way to go. "Any remedy that a terrorist could employ [to conceal radioactive material] would automatically make him more vulnerable to detection," says Winso. "You can use large quantities of lead to shield gamma sources, but that creates an awful lot of weight." Also, the mixed-sensor approach would help alleviate civil liberty and health concerns. Passive detection systems like SAIC's nuclear portal or Ralph James' wristwatch sensors are noninvasive — in both medical and privacy terms. You're not probing someone's car, the way you would with an X-ray scan, you're just listening for gamma rays coming out of the car. Other than radioactive materials, you wouldn't be able to tell anything about the contents of a vehicle from a passive scan.

While the experts I spoke with seemed convinced that a dirty bomb attack was more likely than a nuclear weapon, there was also a consensus that nukes would be harder — but not impossible — to detect. Unlike a dirty bomb, which disperses radiation that's already there, a nuke creates the majority of its radiation in the fission process. "This kind of system would have great utility for detecting radiological material that could be used in dirty bombs," explains Philip Anderson, director of the Homeland Security Initiative at the Center for Strategic and International Studies. But if a nuke reaches US soil, it's already too late. "With nuclear weapons, we have to go to the point of origin."

Because nuclear weapons are larger, we could offset this by routing bigger vehicles through fewer portals, which would be outfitted with both X-ray and gamma ray scanners. Officials could distribute the cheaper microsensors along the city's periphery, detecting suspicious radiation stored in smaller vehicles, while channeling all the trucks large enough to carry a real nuke past the more expensive probes. This would add some friction to the flow of commerce into a metropolis, but those roads are already teeming with tollbooths and weigh stations. Sure, building an atomic wall might involve rerouting some of the traffic coming into cities, but we've pulled off larger feats of urban engineering. And in those cases, the cost of doing nothing was far less.

No strategy to reduce the risk of nuclear terror is bulletproof. Even if scanning technology improves, it's always possible that a van containing deadly material might slip through. Prevention is a game of odds, not certainty. But if you think the technology can reduce the chance of countless urban casualties, then at a certain price, it's worth doing.

Before I leave the Brookhaven campus, James pulls me over to his bookshelves, near the patent grants displayed on the wall. He grabs a small jewel box off a shelf and opens it to reveal a gray block the size of a sugar cube. "This is the microsensor I was telling you about," he says proudly, as though we're looking at photos of his children. "It's made of cadmium zinc telluride, which can detect gamma rays at room temperature. This is missing the electrodes and supporting circuitry you'd need for wireless transmission, but you can see how small it is."

James hands me the sensor, and I imagine millions of them scanning trillions of invisible particles like an oversize urban immune system. I ask him if he thinks such a system will ever be built. He pauses for a second. "Let me just say that sensors have already been deployed in New York and Washington. I don't want to make a comment beyond that regarding the specific locations to give information to terrorists." His smile seems to say, We're working on it. To be sure, building an atomic wall wouldn't be reason to stop doing all the other things we already do to keep the world free from radiological terror: weapons inspections, military strikes, peace marches. But like the city walls of old, an atomic wall of networked sensors might have the single most profound impact on our perception of safety, particularly for those of us living within the obvious targets. It would give the current system of policing radioactive materials a new kind of redundancy, one reassuringly close to home. You'd pass by those sensors at the exit ramp or the tollbooth, and you'd know that something, somewhere, was counting the gamma rays.

The Wall At Work

An "atomic wall" may seem far-fetched, but experts believe a detection perimeter could stop radiological and nuclear weapons — or at least provide a much needed level of redundancy in the effort to police them. Here's how it might work.

1. As a terrorist approaches the Beltway, a scanner above the on-ramp detects gamma rays emitted by the radioactive material in his vehicle.
2. A silent alarm alerts authorities. As the terrorist passes through the scanner, a video camera records his vehicle's make, model, and license plate.
3. Police set up roadblocks and locate the vehicle. To keep traffic flowing smoothly, false positives would need to be kept to a minimum.
4. An emergency response team searches each suspect vehicle by hand or with a MobileSearch detection unit.

Safe Harbor

First, secure the sea.

On September 10, Coast Guard agents looking for stowaways on a cargo ship docked in Port Elizabeth, New Jersey, found something altogether worse: trace amounts of radiation. They ordered the Liberian-flagged freighter to move offshore and called the Pentagon, which dispatched special operations troops trained in detecting nuclear weapons.

In the end, no weapons were found (the radiation came from ceramic tiles), and the crisis passed. But the scare was a reminder that ports are both the easiest way for terrorists to bring nukes into the US — and the best place to stop them.

Container ports are the natural first brick in any "atomic wall" of radiation detection. They are choke points on a grand scale, relatively small in number, huge in volume, and at least partially automated. Although there are more than 360 maritime ports in the US, the vast majority of the 8 million containers that enter the country each year go through a handful of massive shipping hubs, led by Port Elizabeth and California's Long Beach.

Unlike cars and delivery trucks, cargo containers are all the same size — ideal for automated scanning. They are handled by a machine at least once — lifted by a giant gantry crane off the ship they arrived on — and usually again when loaded on a train or truck to travel to points throughout the country. Most are also typically examined by an inspector at the port, if only to ensure documents are in order.

This controlled dockside setting is emerging as the test bed for technologies that could eventually be deployed around cities and other transportation hubs. At Port Elizabeth, the protocol is clear: First, a customs agent equipped with a radiation pager — a handheld Geiger counter — walks around the container. Then the bin passes under the arm of a massive truck-mounted VACIS (vehicle and cargo inspection system) machine, which uses gamma radiation to image the contents in much the same way X-ray machines view luggage. Two inspectors in the VACIS cab examine an image of the truck's metal skeleton, the density of its payload mapped in splotches of color. If the scan reveals something that does not agree with the manifest, inspectors may search the container with a density-determining "blaster," a stud-finder on steroids, or even hand-inspect it.

The system is powerful — the VACIS can see through as many as 3 inches of steel, which should allow it to catch any shielding that would hide a nuclear weapon from radiation sensors — but expensive and time-consuming. The scanners cost about \$1 million each, and Port Elizabeth's four Vacis machines can handle only about 700 containers a day (21 percent of the total). Likewise, the port's 270 uniformed customs officials have time to hand-inspect only about 2 percent of incoming cargo — and less than half of those inspectors are equipped with radiation pagers. "If we had more technology, we'd be able to inspect more containers," explains Richard O'Brien, the port's deputy chief inspector. "Basically, we're now in a situation where we gauge our success by what we don't find." He pauses. "We know we've done a good job if nothing blows up."

Deploying a network of relatively cheap sensors would help. For instance, if each of Port Elizabeth's cargo cranes had radiation detectors — like those installed at Virginia's Hampton Roads port in the wake of September 11 — they would check every arrival automatically. So would sensors in ocean buoys and beacons. Officially, such measures are under consideration; unofficially, government sources acknowledge that some may already be installed. The Coast Guard has asked for a 36 percent budget increase next year to expand these efforts. That's a good start.

— Charles Graeber

Steven Johnson is the author of *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*. He wrote about artificial intelligence in *Wired 10.03*.

<http://www.wired.com/wired/archive/10.11/nukes.html>

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Christian Science Monitor

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Pg. 1

US Moves Into Emerging Bioweapon Era

Rapid biotech developments, like Russia's use of fentanyl, are leaving international treaties behind.

By Brad Knickerbocker, Staff Writer of The Christian Science Monitor

The use of poison gas to subdue Chechen rebels in Moscow, together with what the Bush administration says is the growing threat of Iraq's chemical weapons, comes as the United States itself investigates new substances that can be used to disable terrorists — perhaps even battlefield opponents.

More profoundly, the opiate used to knock out the Chechen attackers (which killed 117 of 763 hostages) reflects a new era in weapons development: using biotech advances to degrade enemy forces while enhancing one's own troops. According to Pentagon documents, the Defense Department is studying the development and use of so-called

"calmative" chemicals as well as "incapacitants, malodorants, and possibly convulsants." The idea is to take the fight out of an attacker without inflicting mortal damage.

One report commissioned by the Marine Corps' Joint Non-Lethal Weapons Directorate concluded after an "extensive review conducted on the medical literature and new developments in the pharmaceutical industry" that "the development and use of [incapacitating agents] is achievable and desirable."

Critics say that by designing such weapons as an 81-millimeter mortar round that can carry a chemical payload a mile and a half, the US may be violating international treaties.

International Treaty Law

As was true during the Moscow hostage crisis, the challenge will be minimizing harm to innocent civilians. Officials appear to recognize the sensitivity of this matter: A Defense Department review of legal requirements for nonlethal weapons development asks "whether the weapon causes unnecessary suffering ... whether the weapon is capable of being controlled in a discriminatory manner ... whether there is a specific rule of law prohibiting its use."

Chemical and biological weapons are controlled by three treaties dating back to 1925. In essence, nations may not develop, possess, or use such weapons. The Chemical Weapons Convention of 1993 has been signed by 174 countries (including the US) who pledged to destroy chemical arsenals.

The treaty defines a chemical agent as "any chemical, which ... can cause death, temporary incapacitation or permanent harm to humans or animals." That would seem to describe the opiate fentanyl used by Russian security forces.

But the treaty also allows the use of chemical agents for riot control and other law-enforcement activities – a loophole which presumably could be interpreted to mean anything related to domestic terrorism, perhaps even "hot pursuit" of terrorists beyond national boundaries.

One major problem is the relative level of effect among combatants and civilians – including children and the elderly, who may suffer much worse effects (including death) than stronger and fitter soldiers. Trying to incapacitate snipers in – say – downtown Baghdad makes it very difficult to discriminate between combatants and bystanders caught in the crossfire, just as it was in Mogadishu, Somalia, in 1993.

Research Spillover Effects?

The concern about developing chemical and biological weapons has a broader context as well: the Pentagon's research into "performance-enhancing" drugs. US Air Force pilots flying long-range missions regularly take amphetamines ("go pills") to fight fatigue and then sedatives ("no-go pills") to induce sleep.

But far more advanced means of enhancing performance are being studied by the US Special Operations Command, the Defense Advanced Research Projects Agency, and other Defense Department organizations. One example is quarter-sized body "monitors" that can be implanted under the skin of a soldier's neck and used to trigger the release of chemicals for "body regulation" and the release of "rejuvenating drugs."

"That research is very much alive and well," says retired Rear Adm. Stephen Baker, the Navy's former chief of operational testing and evaluation.

The danger is that it may be only a short step from developing chemical and biological agents that enhance US soldier's performance from those that degrade enemy troops. In fact, the potential for overlap in the research leaves some experts worried.

"It would be difficult to argue that military performance enhancers violate any treaties," says Edward Hammond, director of the Sunshine Project in Austin, Tex., a research center that investigates biological and chemical weapons in the US and Europe. "But their widespread use would lower the threshold for use of chemical weapons, particularly psychoactive substances, in conflict."

"If enhancing yourself is routine," Mr. Hammond asks, "how large a step would it be to chemically 'diminish' or 'de-enhance' your enemy?"

The Biotech "Revolution"

What seems likely is that the science of such advanced weaponry soon could outpace anything envisioned in arms control treaties – if it hasn't already.

"There is a profound revolution underway in biology," says Mark Wheelis, a microbiologist at the University of California, Davis. "The same tools that are revolutionizing drug discovery can be used to discover novel biochemical agents for the purpose of weaponization." This could even include genetically engineered biological weapons designed to attack things like camouflage paint, stealth coatings, and electronic insulation – an area of research sought by the Navy and the Air Force.

"I can understand the military infatuation with these technologies," Dr. Wheelis said. "There's a clear tactical utility to these weapons," he said. "But they come with a cost and the cost is largely in the area of arms control and we'd better be sure we want to pay that price before we actually do it."

In any case, Wheelis writes in a recent report for the Monterey Institute of International Studies, that "the technical landscape of chemical and biological arms control is rapidly changing."

There is no doubt that the Pentagon is canvassing this landscape to craft defensive responses to potential enemy use of these weapons against US soldiers. But they may also be looking at these weapons for their own interests, as a way of defeating terrorists or other enemies as well.

"In principle, bioengineering is on some level just an information processing problem," says John Pike, head of GlobalSecurity.org in Alexandria, Virginia, which researches and analyzes national security issues. "And how much longer will [it take] before the information processing required for shake-and-bake bioengineering starts to become easily within the reach of a bright lunatic?"

"I don't know the answers to any of these questions," says Mr. Pike. "But I reasonably assume that the US government would like to get these answers many years before anyone else has them."

At least some answers may emerge this week when the National Academy of Sciences is expected to issue a report on non-lethal weapons.

Clash Over Old Chemical Arms

As required under the Chemical Weapons Convention of 1993, the US is working to rid itself of millions of bombs, rockets, spray tanks, and other weapons containing nerve gas, blistering agents, and other deadly chemicals.

The newest of those weapons date back to 1968 (when the US stopped making them) and some are remnants of World War II, which means that many are leaking toxic substances.

At several federal government sites around the country, such weapons are being incinerated.

The process has had some technical problems causing leaks and other safety issues, and there have been delays tied to lawsuits challenging the program. For example, the Army's Umatilla Chemical Depot in Oregon has been preparing to burn more than 7 million pounds of Cold War-era chemical weapons stored in concrete bunkers.

But a lawsuit brought by a coalition of environmental groups that is now being heard in state court alleges that incineration is not a safe method of disposal.

Getting rid of old chemical weapons, it seems, is just as controversial as the prospect of developing new ones.

<http://www.csmonitor.com/2002/1104/p01s04-usmi.html>

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Los Angeles Times
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In Event Of War, Patriots Won't Be On Front Line

The Pentagon considers the antimissile system so unreliable that it plans to try taking out Iraq's Scud launchers before they can be used.

By Paul Richter, Times Staff Writer

WASHINGTON -- A decade after its fiery combat debut in the Persian Gulf War, the capabilities of the Patriot antimissile system remain so uncertain that it will play only a secondary role if the United States again goes to war with Iraq, say U.S. officials and analysts.

The Patriot, the Pentagon's most advanced antimissile system, is already deployed in Saudi Arabia, Kuwait, Qatar and Israel to help defend against Iraq's inventory of two dozen to four dozen Scud missiles.

Yet despite an intensive development effort since 1991, the Patriot's ability to destroy all its targets is considered so unreliable that Pentagon planners are focusing their antimissile efforts on how best to find and destroy Iraqi President Saddam Hussein's mobile Scud launchers before the missiles are fired, according to U.S. and private analysts.

The missile defense mission is a top priority in war planning because Hussein is expected to try to bombard U.S. troops, Israelis or other allies with Scuds tipped with chemical or biological warheads if attacked. In the Gulf War, the most damaging attack on U.S. forces was a conventional Scud strike that hit an American barracks in Saudi Arabia, killing 28 soldiers and injuring 99.

Iraqi Scuds also hit Israel, but the U.S. applied diplomatic pressure and used financial inducements to keep the Jewish state from responding. This time, Prime Minister Ariel Sharon has warned the Bush administration that Israel will strike back if Scuds cause civilian casualties.

Fearful that an Israeli response would inflame the Arab world, the U.S. has made eliminating Scuds a priority.

Pentagon officials say they are confident that the Patriot will eventually work reliably. But they acknowledge that the model now in the field, the Patriot Advance Capability-2, has limitations. A more advanced version, the Patriot Advanced Capability-3, or PAC-3, continues to struggle through development.

The PAC-3 ran into unexpected problems during a round of testing this year. Fewer than half the tests were successful, prompting Army officials to put off full-scale production for at least a year.

Some private defense experts question whether even the PAC-3 could take out Scuds in battle conditions, noting that the Iraqi missiles fly an unpredictable path that makes it hard for Patriots to hit them.

And some contend that the Patriot may be ineffective against newer short-range Iraqi missiles, which could be launched in volleys that they say could overwhelm the Patriot system.

Patriots rely on sophisticated radar and computers to identify threatening missiles or aircraft when they come within range. The system automatically fires interceptor missiles that travel at 4,000 feet per second and destroy the enemy missiles as they arc down toward Earth.

Asked if the military now views the Patriot as the answer to the Iraqi missile threat, defense officials express confidence in the technology but stop short of promising that it can be relied on to knock down a high percentage of Scuds.

"It's been tested pretty rigorously, we've been at it a long time, and we're ready to declare it's a useful military system," Air Force Lt. Gen. Ronald Kadish, head of the Missile Defense Agency, said Thursday at a meeting with reporters.

During the Gulf War, the weapon at first appeared to be highly successful as a "Scud buster." Then-President Bush declared that in 42 attempts, Patriots had destroyed 41 Scuds.

But soon it became clear that the Patriot interceptors were often striking only metal debris from disintegrating Scuds, not touching their warheads. After the war, a congressional study found that the Patriots had been effective against only four Scuds; one Israeli study contended the number was zero.

Plans to give the Patriot a limited role in any new campaign against Iraq come as a disappointment to missile defense advocates who have embraced it as proof that this complex, expensive technology can work.

Critics of the program point to the problems as evidence of the immense challenges the Bush administration faces in building the much larger and more elaborate long-range missile defense system that is its ultimate goal.

James M. Lindsay, a former National Security Council aide who advocates a limited national missile defense, said the Patriot "is going to play only a supporting role.... The military is hopeful for what Patriot could do, but they clearly don't intend to rely on it solely."

Lindsay, now a Brookings Institution scholar, said this means missile defense advocates must confront the core questions of the missile defense program, "which has been long on promises and short on products."

There is also skepticism about the Patriot from America's closest military ally in the region, Israel.

Israel has deployed Patriot missile batteries since the Gulf War. But it has also built its own missile defense system, the Arrow. The Israelis say the Arrow -- half the costs of which have been paid by the United States -- will eventually be able to protect the entire country.

The Arrow is different from the Patriot in several respects. To begin with, it fires missiles that seek to blow up enemy warheads at a higher altitude, thus enabling it to protect a larger area.

And by blowing up warheads higher above Earth, these missiles are better able to disperse chemical agents and expose any biological agents to sunlight, which can destroy them.

By deploying both the Arrow and the Patriot, the Israelis have two shots at eliminating enemy missiles, an arrangement known as a layered defense.

Even with two systems, the Israelis remain determined to try to destroy Iraq's mobile Scud launchers in western Iraq before they can fire rockets. The Israeli government has been pressing the Bush administration to pledge that U.S. forces will complete that job at the opening of any campaign against Hussein.

Already, news reports from the region say U.S. or Israeli special forces have been active in western Iraq looking for Scud launchers and the weapons stores that Hussein is believed to have hidden there.

The Patriot has a long history, involving cost overruns and delays, periods of progress and unexpected reversals of fortune.

Begun as an anti-aircraft weapon in 1965, the Patriot was forced to take on the much tougher job of destroying Scuds during the Gulf War.

The latest Patriot system has a more fine-grained radar than the one now in the field. It enables operators to distinguish enemy warheads from other flying objects. The missile is more maneuverable and better able to destroy warheads because it collides with them at high speed, rather than setting off an explosion in the air close by.

In tests conducted by its builder, Lockheed Martin, the new Patriot performed well, hitting its target in 11 of 12 tries. Advocates say this is proof the program can work.

"Not only can you hit a bullet with a bullet -- you have been doing it repeatedly. For some reason, that hasn't seeped into the talk shows and media debates," Rep. Duncan Hunter (R-Alpine), chairman of the House Armed Services research and development subcommittee, declared in a hearing with Pentagon missile defense officials last year. Yet the results were not as good when the new Patriot was tested by the Army this year under conditions more demanding and closer to those the Patriot would confront in combat.

In some tests, the interceptor missiles failed to strike their targets; in some cases, they didn't even leave the launchers. There were electrical problems and software glitches, and in one case the missile nicked its target but didn't destroy it.

Philip E. Coyle, the Pentagon's chief weapons tester from 1994 until 2001, said that based on those tests, the Patriot could be expected to bring down less than 50% of incoming Scuds.

Gen. Kadish, the missile defense boss, said he was "disappointed" in the test failures, but he insisted that they did not reflect a weakness in design.

Some defense experts believe that additional problems with the new Patriot will emerge if it has real-life confrontations with Scuds.

Scuds, which were built on the crude design of Germany's World War II rockets, are not engineered with precision and can wobble or corkscrew in flight.

Some experts contend that the Patriot is unprepared for such challenges because, with the exception of two 1997 flights, there has been little testing of Patriots against Scuds.

This year, the Senate included language in the defense authorization bill requiring the Pentagon to test the Patriot against Scuds.

Defense experts say it makes sense for Pentagon war planners to place their greatest emphasis on destroying Scud launchers rather than relying on the new missile-defense hardware.

Lindsay, of Brookings, says this is true because of growing confidence in Special Forces' ability to locate and destroy launchers. Although U.S. forces failed badly at this task in the Gulf War, since then there have been marked improvements in the military's imaging and surveillance technologies and in its ability to quickly reach and destroy such targets.

The Pentagon has announced plans to send the 40 advanced PAC-3 missiles that have been built so far to the Gulf, even though the new system is still being tested. And Kadish has suggested that the production rate of two a month be stepped up.

Even so, former weapons tester Coyle says he believes the PAC-3 "won't be [present] in very large numbers. And they won't be able to rely on them."

<http://www.latimes.com/news/nationworld/world/la-fg-missile2nov02004450.story>

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New York Times
November 4, 2002

White House Rejects North Korean Offer For Talks

By Philip Shenon

WASHINGTON, Nov. 3 — The White House today rejected an offer from North Korea to open negotiations over the North's newly disclosed nuclear weapons program, with its spokesman saying there could be no talks until the program was dismantled.

"North Korea knows what it needs to do," said the White House spokesman, Ari Fleischer. "It needs to dismantle its nuclear program and honor its treaty obligations."

Speaking to reporters aboard Air Force One as President Bush headed to Illinois on a pre-election political trip, Mr. Fleischer was responding to statements made through the North Korean Mission to the United Nations in which the North called for talks on its nuclear program, and said it was open to meeting the Bush administration's demand for an end to the uranium-enrichment program.

In the statements, the North Koreans said they would also be willing to consider international inspections of the uranium facilities.

But Mr. Fleischer suggested that the United States was unwavering in its demand that North Korea must dismantle the program first, before any talks could occur.

"It's not a question of talking," he said. "It's a question of action."

He continued, "North Korea should not have abandoned its obligations, and that's what they've done."

North Korea has acknowledged that the uranium-enrichment program is a violation of a 1994 agreement with the United States, but it has insisted that it was the United States that first violated the accord through a series of actions, including its failure to deliver two civilian nuclear power plants that were promised under the accord.

Mr. Fleischer said today that the United States would continue to try to pressure North Korea through American allies.

"We continue to talk to our allies about the approach to take, so North Korea will proceed to honor their word," he said. "North Korea in 1994 entered into a quid pro quo, and it's inappropriate for North Korea to say that we will walk away from our quid and ask for more quo. They entered into an agreement, they should abide by the agreement, and that's why we're working in concert with our allies."

The North Korean Mission to the United Nations, the North's sole diplomatic post in the United States, had no immediate comment in response to Mr. Fleischer's remarks.

<http://www.nytimes.com/2002/11/04/international/asia/04DIPL.html>

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Navy News & Undersea Technology

November 4, 2002

Pg. 1

U.S. Military Leader Says New Technology Needed Against WMD Weapons

By Dave Ahearn

There is no way to prevent terrorists possessing weapons of mass destruction from using them. But technology should be developed to help detect when such weapons are deployed, and to help the military and others respond afterward, a senior Pentagon official said last week.

"There's widespread consensus that terrorists can't be deterred" from attacking military personnel, innocent civilians or other targets if the terrorists gain access to weapons of mass destruction, said Dale Klein, assistant to the secretary of defense for nuclear, chemical and biological defense programs.

Thus, means must be found to keep terrorists from acquiring weapons of mass destruction, to prevent those weapons from harming military personnel and civilians if terrorists do obtain them, or to neutralize the effects of those weapons, Klein said.

"I always like to see [support for] research and development," such as that at the Defense Advanced Research Projects Agency, or DARPA, Klein said.

The Washington area is protected by the current state-of-the-art technology, including sensors that detect biological agents, some that sense chemical warfare agents, and still others that keep watch for radiation, he said.

Chemical weapons, shortly after deployment, reveal their use because humans and animals swiftly develop symptoms. But that isn't always true with biological agents, where disease symptoms may not appear for days, he said.

It is critical that a biological attack be perceived swiftly, so that vaccinations or other ameliorative steps may be taken to protect personnel and citizens, Klein said. For that reason, he said, hospitals continuously monitor symptoms of patients to detect possible exposure to biological weapons, he said.

If the number of patients complaining of a suspicious symptom suddenly skyrockets, medical personnel can begin testing those patients for exposure, he said. For example, a large number of patients complaining of respiratory congestion might merely be the onset of a flu epidemic—or it could be the first sign of exposure to anthrax, plague or smallpox organisms.

"It's important to get it early," Klein said in an interview.

To that end, what would be helpful would be better technology to detect and warn of weapons of mass destruction deployment, he said. Earlier, he spoke before a Global Conference & Exposition on Nuclear, Biological and Chemical Terrorism. The event was organized by E.J. Krause & Associates, Inc., and sponsored by Management Technology in cooperation with the Hudson Institute think tank and the Homeland Security & Defense newsletter.

Rising Terrorism Toll

Klein said terrorists are able to cause death and destruction on an increasing scale. He recalled there were relatively few deaths when terrorists deployed sarin gas in the Tokyo subway system. In the U.S. anthrax attacks last year, five died. In the Oklahoma City bombing of the Murrah federal building, 168 died. In Moscow, 117 died as authorities

stormed a theater where Chechen rebels held hundreds of captives. And in the attacks on Sept. 11, 2001, thousands died.

Also, 17 sailors died when terrorists in a small boat bombed the USS Cole (DDG 67) destroyer in the Middle East, an attack that might have been prevented if technology existed to detect the presence of explosives on watercraft at a distance of hundreds of yards.

New approaches must be devised to counter the threat posed by terrorists waging war against the United States, Klein said.

Strategies

First, he said, there should be efforts to find the terrorists and take them down before they cause any harm.

Second, assuming that isn't always possible, the military and others must find ways to deny terrorists access to nuclear, chemical and biological weapons. For example, he said, a gamma ray imaging system has been developed that can detect weapons hidden inside cargo containers on container ships, or that might be hidden inside trucks crossing a border.

Third, he said, the military must ensure there is airtight security on nuclear, chemical and biological weapons stockpiles. If weapons are outmoded, they should be destroyed, lest they fall into evil hands, he said.

Additionally, he said, better technology is needed for protective suits that military personnel can wear to continue operating effectively even in an environment contaminated by weaponized disease organisms, chemical weapons agents, or radiation.

Many suits now are bulky, and very hot in warm climates, impairing the effectiveness of military personnel to fulfill their missions.

Currently, the U.S. military possesses improved chemical-biological protection suits, but some of them can't be located, and some are being sold at steeply discounted prices as surplus gear, even though there aren't enough suits for all personnel, the General Accounting Office has reported. (Please see Navy News & Undersea Technology, Monday, October 7, 2002, page 10.)

Finally, if terrorists manage to obtain biological weapons of mass destruction, and they manage to deploy them, and protective suits don't work or aren't available, then military personnel need to have medical technology protect them, such as with anthrax vaccines, Klein said.

He noted, though, that anthrax vaccinations are "controversial." That statement referred to recent GAO findings that some 84 percent of personnel surveyed who received anthrax shots complained of negative side effects. Many others transferred to other duties or units, or left military service altogether, to avoid taking the shots, GAO said.

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Defense Week
November 4, 2002
Pg. 1

CIA: North Korea's New ICBM May Be Ready For Testing

By John M. Donnelly

North Korea's new ICBM may be ready for testing at any time, and the country's reclusive leader might use it—and "whatever means are at his disposal"—if his regime's survival is at stake, U.S. intelligence agencies have concluded. The means at Kim Jong-il's disposal reportedly include at least one nuclear warhead and the missiles to deliver it. The new ICBM, called Taepo Dong-2, could, if it works, deliver a nuclear-armed missile to most parts of the United States, U.S. experts say.

"The multiple-stage Taepo Dong-2, which can reach parts of the United States with a nuclear-weapon-sized payload (several hundred kg), may be ready for flight testing," said the CIA in a previously unpublicized April letter to the Senate Select Committee on Intelligence. The letter is one of three from U.S. intelligence agencies found in a committee hearing record printed a few weeks ago.

"Given the North Korean leadership's commitment to regime survival, we cannot rule out the possibility that Pyongyang—despite understanding the likely consequences for doing so—would be prepared to use whatever means are at its disposal if it perceived no better options to try to preserve the regime," the CIA said.

North Korea has continued developing the Taepo Dong-2 despite the fact that Pyongyang has foresworn flight tests for now, the head of the U.S. Missile Defense Agency said Thursday. Air Force Lt. Gen. Ronald Kadish told reporters: "From all indications I see, the answer is, yes."

The intelligence finding suggests that North Korea not only has covertly pursued nuclear weapons, an admission Pyongyang made in October, but also that North Korea is making progress on its most capable ICBM despite the freeze on flight tests. And the letters to the Senate committee indicate U.S. officials believe that, while North Korea possesses these weapons mainly to deter and coerce other countries, Pyongyang is also capable of using them—despite the threat of massive U.S. retaliation.

Despite the dire warning, the spy organizations have long maintained that if a nuclear, chemical or biological weapon were delivered to U.S. shores, a missile is the least likely means of delivering it. More likely means are ships, trucks, airplanes—or even backpacks. In addition, the agencies only say North Korea is likely to use these weapons in the event it is losing a war.

The Defense Intelligence Agency and the State Department's intelligence branch also wrote the committee. All three agencies responded to queries about a range of threats; all three took similar positions on North Korea. Their letters are six months old and in some aspects dated. But the last time intelligence leaders testified publicly about worldwide threats other than al Qaeda and Iraq was in March. Consequently, the three assessments, which fill 74 pages, are the U.S. intelligence community's most recent public analysis of global security.

The recently released letters are unusually candid and detailed. For example, the CIA's letter says the United States is "convinced" Iran is pursuing the atomic bomb. The State Department says that, if India and Pakistan fight a nuclear war, India can "prevail, if we can use that word." And the DIA says definitively that nuclear-weapons materials "have been stolen from some Russian institutes" and there have been about a dozen reports of such incidents in each of the last few years.

Road to an ICBM

"The greatest risk of conflict" on the Korean peninsula, according to the DIA, "would occur if Pyongyang miscalculates the strategic equation, perhaps as a result of an internal crisis, a regional conflict or a belief that military action by the U.S.-ROK [Republic of Korea] Combined Forces Command was imminent."

According to the State Department, "Pyongyang might be tempted to initiate a conflict if it felt it was under direct threat as a result of a sharp deterioration of its security environment." However, State adds: "We do not believe North Korea would fire its missiles against U.S. forces in any situation short of war."

U.S. officials have known and publicly stated for some time that the North Korean regime has one or two plutonium bombs. But in October, North Korean diplomats admitted to American officials that Pyongyang has pursued a covert program to enrich uranium for nuclear weapons, in violation of a 1994 agreement to halt the nuclear program.

In 1998, Pyongyang surprised the world with a test of the Taepo Dong-1, a three-stage rocket, which failed to launch a satellite into orbit. The rocket flew over Japan and crashed into the ocean, but it was significant because the first two stages performed as planned, experts say. So North Korea, in effect, successfully demonstrated a two-stage, 2,000-kilometer missile capable of delivering a nuclear warhead to much of Asia, officials said then. The officials included U.S. government missile-proliferation experts, including Robert Walpole of the CIA and David Osias of the DIA.

Moreover, even though the Taepo Dong-1's final propulsion stage failed in 1998, it still reached a trajectory sufficient to carry it to ICBM range, or 5,500 kilometers, the U.S. experts said.

After the Taepo Dong-1 test, North Korea agreed to a moratorium on rocket tests. Less well known is the fact that Pyongyang agreed to stop such testing only until 2003.

However, the U.S. agencies now report, the moratorium on flight tests has not frozen development on the ground of the more capable Taepo Dong-2.

A question of when

The Taepo Dong-1 has a Scud short-range missile for a first stage and a No Dong medium-range missile for second stage, the experts say. The Taepo Dong-2, by comparison, uses an unknown new missile for a first stage and a No Dong for a second stage.

Significantly, if the Taepo Dong-2 succeeds in deploying the third stage that the 1998 Taepo Dong-1 launch couldn't execute, then the Taepo Dong-2 could strike most or all of the United States, depending on the payload size, the experts have said.

The missile could even carry a nuclear warhead to many parts of the United States, and it could do so with greater accuracy than the Taepo Dong-1, they say. In fact, they add, North Korea might not even bother deploying a Taepo Dong-1 if Pyongyang can master a Taepo Dong-2.

In addition, North Korea may or may not actually test the Taepo Dong-2 before deploying it, the spy agencies say in the new letters, and if North Korea does test it, it probably will be again under the guise of a space launch.

"We believe that the flight test moratorium is having minimal impact on North Korea's ability to continue its development of the Taepo Dong-2 (TD-2) ICBM/Space Launch Vehicle, short of conducting a flight test," wrote the DIA, adding: "While it is unlikely that Pyongyang would deploy the TD-2 without a flight test, such a move is

possible. Although the TD-2 may be ready for flight testing, it also is possible the North Koreans could continue development of improved components during the moratorium."

For their part, the State Department's intelligence officials told the senators: "If North Korea plans to deploy the TD-2, we believe Pyongyang will need to flight-test the missile at least once."

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Washington Post
November 2, 2002
Pg. 9

FBI Secretly Trying To Re-Create Anthrax From Mail Attacks

By Dan Eggen and Guy Gugliotta, Washington Post Staff Writers

FBI investigators and federal scientists have been secretly working for months to replicate the type of anthrax used in last year's deadly mail attacks, as part of a previously undisclosed strategy designed to determine precisely how the spores were manufactured, officials said yesterday.

FBI Director Robert S. Mueller III, who revealed the experiments in remarks to reporters here, said that using such "reverse engineering" could help investigators narrow the list of possible suspects.

"We're replicating the way or ways it might be manufactured, but it is not an easy task," Mueller said. "We are going into new territory in some areas."

The ambitious strategy underscores the continued lack of information available to FBI investigators, who have not succeeded in identifying a culprit more than a year after the first letters containing deadly anthrax spores were mailed. The bacteria, accompanied by threatening notes, killed five people and infected 13 others in the fall of 2001. The incidents also disrupted the mail system and highlighted its vulnerability.

Mueller and other FBI officials declined to say whether investigators were using live anthrax bacteria in their work or whether scientists were culturing the experimental spores from scratch. The experiments began earlier this year and, according to one source familiar with the operation, are being carried out at Dugway Proving Ground, a top Pentagon bioweapons research center, in Utah.

The team involved in the tests includes representatives from several federal agencies, sources said. Jerome Hauer, head of the Office of Public Health Preparedness at the Department of Health and Human Services, said an infectious disease specialist from the Centers for Disease Control and Prevention is assigned to the FBI team.

C.J. Peters, former chief of the CDC's special pathogens branch, said the FBI approach is logical. "Very few people are experts at making anthrax" in a weaponized form, he said, and determining how the anthrax was treated could lead to one of them.

Some experts suggested that federal investigators, who have never coped with an anthrax agent as sophisticated as the material recovered from letters to Sens. Thomas A. Daschle (D-S.D.) and Patrick J. Leahy (D-Vt.), may be feeling their way through the science to discover how difficult the agent would be to make.

"They'd probably want to look at several methods of doing it -- try to make it several different ways to reproduce the end result," said David Franz, head of the Chemical and Biological Defense Division of the Southern Research Institute and former commander of the the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), the nation's principal biodefense research center. "It doesn't seem like an unreasonable idea."

Richard Spertzel, chief biological inspector for the U.N. Special Commission to Iraq from 1994 to 1998, said securing the correct equipment and materials to replicate the anthrax would not be difficult, but getting the spores down to the proper size "is not going to be a simple matter, and it has to be done in containment conditions."

The attempt to manufacture identical anthrax spores is the latest in a series of ambitious efforts. Scientists announced in May that they had sequenced the anthrax genome used to identify the attack spores as examples of the "Ames strain" of anthrax bacteria developed by USAMRIID at Fort Detrick, Md. A month later, scientists at Lawrence Livermore National Laboratory used radiocarbon dating to determine that the anthrax spores had been cultured within the past two years.

A possible profile of the attacker issued by the FBI last November described an angry, "lone individual" with some scientific background who could weaponize the anthrax spores in a basement laboratory for as little as \$2,500 and was likely familiar with the area around Trenton, N.J. The FBI emphasized that there was no "direct or clear" link between the attacks and foreign terrorism.

More recently, investigators have said they were working with an evolving list of as many as 30 potential suspects. Attention has centered on medical doctor and virologist Steven J. Hatfill, a former U.S. Army scientist identified by Attorney General John D. Ashcroft as a "person of interest." Hatfill has vigorously denied any involvement in the attacks.

Mueller said yesterday that FBI profilers have not altered their initial assessment of the likely attacker, and said that "we have a number of individuals that we're looking at." But he also said that investigators have never ruled out any scenario, a reaction to criticism from some scientists that the FBI is too focused on a domestic loner and neglected the idea of state- or group-sponsored terrorism.

Investigators and experts have said the spores in the Daschle and Leahy letters were uniformly between 1 and 3 microns in size, and were coated with fine particles of frothy silica glass. The weaponized product was astonishingly pure -- 1 trillion spores per gram -- and so light that it simply floated into the air, ready to be inhaled, as soon as the envelope was opened.

There are several ways to mix anthrax spores with silica, ranging from shaking the two ingredients together in the biowarfare equivalent of a plastic bag to sophisticated processes such as a "spray dryer," in which a water-mixed slurry of spores and glass particles is squirted into an enclosed chamber and combined with superheated air.

William C. Patrick III, the former chief of product development for the U.S. Army's now-defunct bioweapons program, said the information available on the attack suggests a high-end production facility.

"Anthrax is relatively easy to grow; it doesn't require any special nutrients," Patrick said. "But having grown it, you have to dry it and keep it dry, and you have to have a pretty tight system. You need a minimum amount of equipment for that; you just can't go out in the woods and create this."

Staff writer Ceci Connolly contributed to this report.

<http://www.washingtonpost.com/wp-dyn/articles/A54295-2002Nov1.html>

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Baltimore Sun
November 2, 2002

States Not Ready For Bioterrorism

Federal government has vaccines ready, but then steps falter, reports show

By Associated Press

WASHINGTON - The federal government has truckloads of medicine and vaccines ready to deploy should bioterrorists strike, but only one state is fully prepared to receive and distribute those treatments.

Federal officials say that while states have made considerable progress in preparing for bioterrorism, much work remains.

"Our biggest concern is we will get to a location, and a state or a city will not be ready," said Jerry Hauer, assistant secretary for public health preparedness at the Department of Health and Human Services.

Even Florida, the one state deemed ready to receive the National Pharmaceutical Stockpile, still must conduct drills to make sure its plans will work.

Federal officials emphasize that states could handle an emergency if they had to, even if they are not considered prepared. After the Sept. 11 attacks, when the stockpile was deployed for the first time, it took New York City officials "several valuable hours" figuring out where to send 50 tons of general medical supplies and how to secure them - but eventually the medicine was delivered, said Steven Bice, who runs the program for the Centers for Disease Control and Prevention.

Yesterday was the deadline for states to report progress in preparing for bioterrorism. Key questions asked by HHS included how they will distribute medicine, where they can provide 500 hospital beds in case of mass casualties and how hospitals will isolate highly contagious patients.

Most regions are not prepared to dedicate 500 beds in an emergency, much less the 1,500 beds that they are supposed to have in place by next year, Hauer said. Fewer communities have rooms in place inside hospitals for isolating infectious victims of bioterror attacks.

States have until Dec. 1 to produce detailed plans for vaccinating their entire populations within days of a smallpox attack. So far, plans have been filed by 20 of the 62 states, large cities and territories that are receiving federal bioterrorism money. And those plans, not yet scrutinized, might have serious holes, health officials say.

Many states admit they are far from ready.

In Kentucky, officials have not yet figured out who will deliver the shots or where to find the people to do it, said Dr. Steven Engender, the state epidemiologist. He said it could take 60,000 people at 250 clinics to vaccinate Kentucky's 4 million people over five days.

"That's the math. The practicality is something different," Engender said this week.

Hauer says that math could be conservative if there were an outbreak of smallpox - a highly contagious, fatal disease.

"Five days might actually be a luxury," Hauer said.

This year the federal government began distributing \$1.1 billion to help cities and states improve communications, upgrade labs, hire disaster coordinators and build up neglected public health systems. At the last progress report, in June, HHS identified several problems.

In Arkansas, officials had plans to train people to respond to bioterrorism, but not to detect disease in the first place. In Delaware, planners identified hospital beds for 250 unexpected patients, half of what federal rules require. In Kansas, officials were planning to spend \$250,000 to handle the National Pharmaceutical Stockpile; federal officials said they should count on needing \$1 million.

Nearly one in three states failed to show how they would work with bordering states, and about half the states failed to include Indian tribes in planning.

Jack Pittman, administrator of public health preparedness at the Florida Department of Health, agreed that working with tribes is a problem.

"We've invited them to formally sit with us on advisory committees. To this date they have not taken us up on that," he said.

Another concern is that states with budget crunches will have federal money to hire needed workers but won't be allowed to spend it because of state hiring freezes.

The most urgent issue might be the handling of the National Pharmaceutical Stockpile.

The federal government can deliver 50 tons of medical supplies to any city in the United States within 12 hours. But communities must be ready to take control of these supplies from the airport. They must have transportation and security for the supplies and a place to distribute them. They need people who can repackage huge cartons of antibiotics into individual doses.

Federal officials use a traffic light metaphor to characterize readiness for the 62 projects, which include the 50 states, the District of Columbia, the cities of New York, Chicago and Los Angeles, the territories of American Samoa, Guam, Northern Marianas, Puerto Rico and Virgin Islands, and three associated independent states: Republic of the Marshall Islands, Federated States of Micronesia and the Republic of Palau.

Just one project, Florida, is in the "green" category, meaning ready to go, pending a rehearsal. Its rating is "green-minus."

Two states are "red-plus" - Wisconsin, HHS Secretary Tommy G. Thompson's home state, and Hawaii - meaning they are making little or no progress. Puerto Rico is also "red-plus"; the Virgin Islands is "red."

Six projects haven't been reviewed yet. The remaining 51 are rated "amber," meaning they are making significant progress toward readiness but aren't there yet.

Among those, eight are "amber-plus," 26 are "amber" and 17 are "amber-minus." Officials would not say which states fall into each subcategory.

<http://www.sunspot.net/news/custom/attack/bal-te.bioterror02nov02,0.7778452.story?coll=bal%2Dattack%2Dheadlines>

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Washington Post
November 2, 2002
Pg. 13

FDA Grants License For Smallpox Vaccine

Debate Continues on How Much of U.S. Population Should Be Inoculated

By Ceci Connolly, Washington Post Staff Writer

The Food and Drug Administration has granted a license for the federal government's 30-year-old stockpile of smallpox vaccine, easing the way for millions of Americans to be inoculated eventually against the deadly virus. Jerome M. Hauer, head of bioterrorism at the Department of Health and Human Services, said the bulk of the first batch of 1.7 million doses had been promised to the Pentagon, which is preparing for potential war with Iraq. The

remaining 13.7 million doses could be used to respond to a smallpox attack or to vaccinate emergency responders prior to any attack.

The Bethesda-based FDA approved the license on Oct. 25 but did not announce its decision. In response to inquiries, officials confirmed yesterday that the vaccine had cleared all regulatory hurdles.

Securing the FDA license makes future use of the vaccine, known as Dryvax, significantly easier for federal health officials, said Dartmouth University's John F. Modlin, who chairs the government's advisory panel on vaccines.

"The only legal way to administer an unlicensed vaccine would be under Investigational New Drug regulations," which involve cumbersome informed consent and patient monitoring, he said. "The license will allow the vaccine to be distributed and administered in a more efficient manner."

Last summer, the nation's top bioterrorism experts recommended a three-step smallpox immunization plan. Under the proposal, presented to President Bush by HHS Secretary Tommy G. Thompson, about 500,000 health care workers would be inoculated immediately and serve as the early investigators into any possible outbreak. Later, as many as 10 million police, fire and emergency responders would be offered the vaccine.

Eventually, all 280 million Americans would have the option of being vaccinated, though that would likely not occur until a new batch of vaccine is licensed sometime in 2004.

Several sources have indicated that Vice President Cheney has advocated broad vaccination in part to deter an attack. But Bush has voiced concerns over the vaccine's dangerous, sometimes fatal, side effects and has not yet decided who should be offered it.

In addition to the 15.4 million doses of Dryvax, the government has 75 million doses of vaccine made by Aventis Pasteur Inc. and has ordered 209 million doses from partners Acambis PLC and Baxter International Inc. It could take as long as a year before the latter two vaccines are licensed.

Technically, the Dryvax was licensed when it was made in the 1970s, but manufacturer Wyeth needed supplemental approval for new bifurcated needles and diluent, the liquid material used to reconstitute freeze-dried vaccine, said Karen Midthun, the FDA's director of the Office of Vaccines Research and Review.

<http://www.washingtonpost.com/wp-dyn/articles/A54248-2002Nov1.html>

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North Korean WMD Facilities and Chronologies

The following text provides detailed descriptions of North Korea's weapons of mass destruction (WMD) programs.

All information was collected by the Monterey Institute's [Center for Nonproliferation Studies](#) from open sources and discussions with North Korean defectors. (see also [North Korea Country Overview](#)) . . .

http://www.nti.org/e_research/e1_nkorea_profile.html

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