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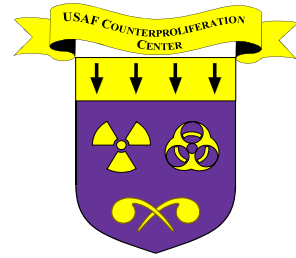
USAF COUNTERPROLIFERATION CENTER

CPC OUTREACH JOURNAL

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Russia's Poorly Guarded Past

Security Lacking at Facilities Used for Soviet Bioweapons Research

By Joby Warrick

Washington Post Staff Writer

Monday, June 17, 2002; Page A01

POKROV, Russia -- Bunker 12A of the Pokrov Biologics Plant is a pill factory like none other on Earth.

To enter, visitors pass through the five-ton blast doors and down the steep corridor to an underground laboratory, built of reinforced concrete to survive a nuclear attack. Inside, a few dozen workers in white coats churn out pain-relief tablets in a room lined with relics from the plant's still-secret past: 30-year-old machines used for growing viruses. Ask the plant's director about the bunker or machines and he chooses his words carefully.

"These were built," Vladimir Gavrillov says, "to handle very dangerous pathogens."

In fact, the full extent of the dangers posed by this obscure pharmaceutical factory is only beginning to be appreciated. Most of the ingredients for a biological weapon still exist here in a crumbling and poorly guarded facility that has become another front line in the battle to keep terrorists from acquiring weapons of mass destruction.

Built ostensibly as a vaccine factory for farm animals, Pokrov operated for decades as a secret within a secret: An off-the-books participant in a clandestine military program that produced the most fearsome biological weapons ever imagined. Together with a sister plant across town, Pokrov specialized in livestock maladies such as foot-and-mouth disease that could be put into weapons and unleashed on American farms in a future war, Russian and U.S. officials say. The same kinds of biological weapons are known to be coveted by al Qaeda, the terrorist group linked last week to a plot to detonate a radiological "dirty bomb" in a U.S. city.

"Anti-livestock" or "anti-agriculture" weapons can wreak economic havoc and even undermine a nation's ability to feed itself. Under the Soviets, as many as six agricultural research centers and up to 10,000 scientists and technicians were believed to have been devoted to developing them, working under a shroud of secrecy that persists today and complicates efforts to keep dangerous materials out of the hands of terrorists, U.S. officials say.

At some of the facilities, animals weren't the only targets. Pokrov's five underground bunkers were equipped as standby production facilities that could also manufacture smallpox weapons in times of war, according to former participants in the Soviet program and U.S. biodefense experts. "Pokrov could do it all," said a senior U.S. analyst familiar with the plant. "It could produce the virus . . . weaponize it and even fill the bombs."

Russia says it has halted offensive biological research and destroyed its bioweapons stockpile. There are close parallels between offensive biological weapons programs, which use lethal pathogens, and the development of defensive vaccines and other medicines using the same dangerous materials. Russia, like the United States, continues to carry out research with a wide range of dangerous microbes, developing vaccines and drugs to defend against natural outbreaks as well as acts of terrorism.

Gavrilov, Pokrov's director, said the facility is engaged only in developing vaccines and other civilian products. According to U.S. officials, the facility is believed to possess more than a dozen viruses, including Newcastle, a highly contagious disease that infects poultry and other birds.

The microbes, along with equipment needed to grow them in massive quantities, are housed in a dilapidated compound that struggles daily to do the basics: patching together its ancient alarm system, paying the arrears of its electricity bill and keeping its underpaid scientists from being lured away to other countries.

Terrorism is a constant worry. Gavrilov acknowledged there have been break-ins, as well as attempts by mysterious "Arab businessmen" to purchase various things. He said none of the attempts succeeded, as far as he knows. "We have security concerns," the plant's director said cautiously. "But fixing them will be complicated and expensive."

Western governments have done virtually nothing to help, despite a growing awareness of the disaster that could result if terrorists acquire a single vial of the deadly microbes stored at Pokrov and more than 50 similar sites in the former Soviet Union. U.S. programs launched 10 years ago to help Russia secure its nuclear weapons have only recently begun targeting biological and chemical facilities, and progress has been slowed by money shortages and bureaucratic resistance in both countries.

Some of the largest of the former Soviet bioweapons centers, such as Vector, the onetime smallpox production complex in western Siberia, have erected fences and installed security cameras in the past three years with U.S. assistance. But at Pokrov, the first formal security assessment isn't scheduled to begin until the fall, despite two years of requests for assistance. Other bioweapons factories have yet to be visited by U.S. officials.

"On the biological side we are far, far behind," said Raymond Zilinskas, a microbiologist and bioweapons expert with the Monterey Institute's Center for Nonproliferation Studies in California. "There's a whole history of things that went on in these plants that we don't even know about."

In a country that produced the world's largest stockpiles of biological weapons, there are ample reasons to fear the unknown. Iran has made attempts to obtain Russian material and know-how for its own bioweapons programs. The same al Qaeda leaders that plotted to explode a radioactive "dirty bomb" in the United States had an equally ambitious plan for acquiring bacteria and viruses of the kind used in Soviet weapons programs, CIA officials told Congress this year.

Former senator Sam Nunn, who has long advocated securing Soviet weapons of mass destruction as a national priority, said a brief visit to Pokrov last month was a reminder of why loose biological, nuclear and chemical material remains the "world's gravest threat."

"We are in a new arms race: a race between those seeking to acquire weapons of mass destruction and those seeking to stop them," Nunn said. "Keeping dangerous things out of the hands of dangerous people is the most important thing we can do."

A Heavily Fortified Vaccine Factory

Even now, a decade after the Soviet Union collapsed, Pokrov's managers won't talk about the peculiar brand of agricultural research conducted there in the last decade of the Cold War.

Officially, the story is the same as it was in Soviet times: The plant produced only livestock and poultry vaccines for peaceful purposes. As a civilian institute of the Agriculture Ministry, Pokrov had no visible ties to the Soviet military.

It also had no official link to Biopreparat, the secret agency established by Soviet military leaders in the early 1970s to launch a massive biological weapons program under the guise of a network of civilian pharmaceutical plants.

While Russian officials acknowledged Biopreparat's existence in the early 1990s, Moscow has never fully disclosed the contributions of other Soviet agencies, such as the Agriculture and Health ministries, to the bioweapons effort.

At Pokrov, the official story begins to unravel within minutes of entering the sprawling campus 50 miles east of Moscow.

The plant's most prominent feature is a row of nuclear-hardened bunkers, an odd architectural choice for an institute concerned mostly with preventing Newcastle disease in chickens. Deputy Director Valery Stavnichy, in leading visitors through the complex, freely pointed out the bunkers' safety features, including the heavy blast doors and an underground water system that ensured uninterrupted production "in the event of emergencies."

What kinds of emergencies?

"Hurricanes. Or earthquakes," the deputy director replied. The Moscow region is not known for either.

Equally jarring to Western visitors is the scale of Pokrov's virus-making capacity. David Kelly, a British bioweapons expert who was among the first Western scientists to visit the factory, recalled his initial shock at finding bunkers filled with row after row of incubators that collectively held tens of thousands of hen eggs. "That's the standard method for growing smallpox virus," he said.

A clearer picture of Pokrov's past has recently begun to take shape from the stories of former Biopreparat officials and U.S. officials and scientists who have slowly built relationships with their Russian counterparts. Ken Alibek, the former Biopreparat deputy director who helped expose the Soviet Union's secret bioweapons programs when he defected to the United States in 1992, said Pokrov's official role as a vaccine factory was a perfect cover for one of the biggest virus mills in the Soviet Union. If war appeared imminent, Pokrov was equipped to immediately begin production of smallpox virus at a staggering rate of 200 tons a year, said Alibek, now vice chairman and chief scientist of the Alexandria, Va., biotechnology firm Hadron Inc., in an interview. The mobilization orders never came. But throughout their history, the Pokrov plant and its sister facility across town tested viruses for use in new types of biological weapons that targeted livestock and poultry, according to Russian and U.S. officials familiar with the program.

Igor Domaradsky, a former chairman of the Soviet Union's secret Interagency Science and Technology Council on Molecular Biology and Genetics, said Pokrov was "one of the biggest" players in an extensive network of institutes exploring anti-crop and anti-livestock weapons that could be delivered by bomb or missile. He said most of the research centered around foot-and-mouth disease, the same illness that prompted the slaughter last year of more than 4 million cows, pigs and sheep in Britain.

"Both of these [Pokrov] facilities were well equipped with a good system of sanitation and security to prevent the possibility of an escape of [viral] agents," said Domaradsky, 77, in an interview at his apartment in Moscow. "Had any escaped, it could have led to the death of many cattle, not to mention an international reaction which would have been very hard to contain."

Eventually, the Soviets abandoned most of the anti-agriculture research, primarily because of the expense and serious reservations among Soviet military planners about the weapons' effectiveness, Domaradsky said. The retired scientist in a 1995 memoir defied Russia's scientific establishment by describing formerly secret details of Biopreparat's activities. He scoffed at what he called the "failure of memory" of Russian officials who still refuse to own up to the nation's past bioweapons activities. But whether they want to talk about it or not, he said, Russian officials must deal with the legacy of Biopreparat and Pokrov, which includes protecting some of the world's most dangerous viruses against theft.

"Even to support vaccine production you need many different strains -- a whole collection of them," he said. "And these need very tight security."

Security: A Dog and a Clay Seal

Each night at 5 p.m., as the last of the Pokrov plant's day shift boards the village bus for home, the job of protecting the factory's virus collection falls to a night watchman and a large German shepherd. The dog is judged highly capable -- "he's very mean," one plant official confided -- but also a poor substitute for the kind of security called for at a place that holds the seeds of multiple epidemics.

If the dog is reliable, that is more than Pokrov can claim for the rest of its security apparatus.

The plant's alarm system is 30 years old, and officials acknowledge it no longer works in parts of the campus, which is overrun with weeds and littered with debris. The military garrison once assigned to Pokrov is gone, and today's guards are mostly old men. A visitor recently saw no sign the guards were armed.

There are bars on the windows in the small building where pathogens are kept. But once inside, security for the virus freezers consists of a simple lock and a string with a seal of soft clay. A disturbed seal is a signal that viruses may have been tampered with -- presumably after the thief has gotten away.

Lawrence Renteria, a Virginia-based security contractor who is helping several former weapons plants improve their systems, said Pokrov is in better shape than some.

"It isn't pretty," said Renteria, senior system engineer for Stratford Technology of Montross. "At one plant we visited, security consisted of two fat guys in sweat pants. They say they patrol the plant. But we know they don't." Officials at Pokrov are acutely aware of the problems with security but said they lacked the money to fix them. Four years ago, the plant ran out of money for its staff, some of whom worked for up to six months without a paycheck, which was common in Russia during the 1990s. Today Pokrov pays workers the equivalent of \$65 a month, with senior scientists earning about \$145.

Pokrov director Gavrilov is eagerly courting Western firms for potential joint ventures that could help pay for new equipment. He also is waiting for U.S. officials to deliver on a two-year-old promise to install a modern security system.

The delay, U.S. officials explained, is due to competing demands on the limited money Congress sets aside each year to help protect and dismantle Soviet weapons of mass destruction. Funding for the Cooperative Threat Reduction Program, established by Nunn and Sen. Richard G. Lugar (R-Ind.) in 1991, has remained essentially flat in recent years, and had been targeted for deep cuts before the Sept. 11 attacks.

For most of the past decade, greater emphasis was placed on safeguarding nuclear materials and physically dismantling strategic weapons such as the massive Soviet submarines that could launch nuclear missiles. Officials acknowledge the U.S. efforts were relatively slow to recognize the threat posed by biological and chemical weapons facilities in the former Soviet Union.

Despite substantial progress, the U.S. programs have managed to provide security upgrades for only about 40 percent of Russia's nuclear facilities, and a much smaller percentage of biological and chemical sites. Lugar, who is pressing for legislation to expand the program, said at the current rate it will be 27 years before some Russian facilities are fully secure.

"If someone gets their hands on just one of these weapons of mass destruction, the horror will be so awesome that all of life will change substantially," Lugar said during a visit to Russia in May. "If we do not take the leadership and take it aggressively, heaven help the rest of the world."

Invitations From Iran

In the western Siberian town of Koltsovo, 1,800 miles east of Pokrov, Russia's only authorized smallpox research facility scarcely worries about intruders. The former bioweapons complex known as Vector is now ringed by three brand-new fences and a network of the latest Western-made cameras and motion sensors.

Troops armed with assault rifles patrol the entrances, stopping and searching each vehicle that arrives or departs from the State Research Center for Virology and Biotechnology, as Vector is formally known. These days, many of the vehicles carry Western businessmen and scientists involved in one of nearly 50 joint ventures currently underway here.

Lev Sandakhchiev, a biologist who now serves as director, acknowledged that new fences have not solved all of Vector's problems. But the heavy U.S. and European presence here appears to have eased multiple security concerns -- including the fear that Iran would steal Vector's microbes or expertise.

"We no longer hear about the Iranians here," said one senior U.S. official who spoke on condition of anonymity.

"We know they are active in other places -- the second-tier places -- but not at facilities where we have influence."

It almost didn't turn out that way. As recently as 1998, Iran was aggressively wooing Vector's top scientists and officers, proposing cooperative ventures intended to enhance Tehran's biological capabilities, said Yuri Klimov, Vector's financial director.

Klimov said he was one of several Vector officials invited to visit Tehran to explore business opportunities -- an invitation he accepted. Describing the encounters in an interview outside Vector's front gate, the natty, powerfully built Klimov said the Iranians turned up at a time of great uncertainty for the institute, which was then struggling to find its niche amid Russian economic chaos and a newly competitive business climate.

"They invited some of our scientists to go to Tehran. I myself went there twice," Klimov said. "They offered our scientists \$5,000 a month -- a very good salary."

The Iranians were vague about their intentions, even with their Russian guests in Tehran, he said.

"They talked about arranging a joint research facility, and they were interested in technologies that we had, especially our expertise in virology," he said. "To be honest, I never understood it. And they would never directly answer our questions."

All the scientists eventually returned to Russia, Klimov said, and further contact with the Iranians was halted -- for the simple reason that newly arriving Western scientists were making a better offer.

"This was the same time when we began to arrange research contacts with the United States," he said. "Ultimately we made a decision to go that way instead."

<http://www.washingtonpost.com/wp-dyn/articles/A61628-2002Jun16.html>

Anthrax Spores From Hill Said to Be Made Recently

Officials Say Finding Suggests Attacker Had Access to Modern Lab and Could Make New Batch

By Guy Gugliotta

Washington Post Staff Writer

Sunday, June 23, 2002; Page A19

Government officials said yesterday that scientists have determined that anthrax spores mailed to Capitol Hill last fall were made less than two years ago, suggesting that the author of the anthrax attacks had access to a modern laboratory and could make a new batch of the lethal pathogens.

The officials said the researchers' new determination did not change the general direction of the FBI investigation, which for months has been searching for a suspect among disgruntled domestic scientists with the expertise needed to culture, mill and "weaponize" the spores.

But the new findings cast further doubt on the hypothesis that the spores could have been stolen from a lab decades ago, saved in dry storage and used in the wave of attacks last October and November.

FBI Director Robert S. Mueller III, at a recent meeting with Washington Post editors, declined to discuss the eight-month investigation in any detail. The new findings do not appear to have pushed the investigation appreciably forward.

The bureau has acknowledged it has no suspects in the case, nor has it identified a source for the spores that infected 18 people and killed five in the worst outbreak of biological terrorism in U.S. history.

Investigators found several letters that contained anthrax spores and suspect others went undiscovered. Most of the ongoing laboratory work, however, uses spores from a letter sent to Sen. Patrick J. Leahy (D-Vt.), found intact in a barrel of unopened mail in November. It is the only anthrax letter that still contained a significant amount of powder by the time investigators took control of it.

Anthrax is a common livestock disease caused by a bacterium that can lie dormant for years in dried spore form. "The secret of spore longevity is to package it in the absence of humidity," said Bill Patrick, a former chief of product development in the offensive biological weapons program that the United States abandoned in the early 1970s.

"When the agents pick up moisture, the particle size grows, the powder deteriorates and the agent loses the qualities that make it a potent weapon," Patrick said. But if the spores are kept dry, they are remarkably resilient.

Figuring out the age of anthrax spores, however, can be difficult. One source said that under a microscope older spores tend to look "wrinkled," but the same effect could be achieved by varying the drying methods to make newer spores look old.

Instead, investigators until recently focused on determining the rate of genetic mutation across generations of bacteria, hoping to backtrack the spores used in the attacks last year to their lab of origin.

Several sources said that this method is not producing results because the genetic variations may not be dramatic enough. Anthrax expert Martin E. Hugh-Jones of Louisiana State University said he had the feeling that the investigation was "grounded."

The new findings on the relative youth of the Leahy spores were first reported yesterday on the New York Times Web site, which suggested that the dating had been done with radiocarbon analysis, a technique more commonly used by archaeologists to determine the age of artifacts tens of thousands of years old.

Biologist Jennie Hunter-Cevera, president of the University of Maryland's Biotechnology Institute, said analysts didn't necessarily have to use radiocarbon dating, which determines the age of an object by the rate at which the radioactive carbon 14 isotope decays in organic materials.

Instead, Hunter-Cevera said "isotopic" analysis could compare the radioactivity ratios from the isotopes of several elements to get an age. Carbon 14 dating is sometimes suspect for recent objects because the atomic testing of the 1950s created higher levels of carbon 14 in the air while increased use of fossil fuels has enriched the air with more inert carbon.

The exact scientific process the FBI has used with the Leahy letter has been kept secret, Hunter-Cevera said, but among microbiologists the news that this technique was bearing fruit began to leak out several weeks ago.

"The FBI appears to be getting good scientific advice," she said.

Staff writer Joby Warrick contributed to this report.

<http://www.washingtonpost.com/wp-dyn/articles/A29872-2002Jun22.html>

Homeland Security: New Department Could Improve Coordination But May Complicate Public Health Priority Setting,

by Janet Heinrich, director, health care--public health issues, before the House Committee on Energy and Commerce. GAO-02-883T, June 25.

<http://www.gao.gov/cgi-bin/getrpt?GAO-02-883T>

Homeland Security: Proposal for Cabinet Agency Has Merit but Implementation Will Be Pivotal to Success

by David M. Walker, comptroller general of the United States, before the Subcommittee on Technology, Terrorism, and Government Information, Senate Committee on the Judiciary. GAO-02-886T, June 25.

<http://www.gao.gov/cgi-bin/getrpt?GAO-02-886T>

Philadelphia Inquirer
June 24, 2002

Official: No Chemical Threat At Base

By Reuters

BAGRAM, Afghanistan - A military official said yesterday that tests that had hinted at the presence of chemical weapons at a U.S. base in Uzbekistan gave a false reading and that the hundreds of troops stationed there had been given a clean bill of health.

"There is no chemical threat," Col. Roger King told reporters at Bagram Air Base, the staging post for the U.S.-led coalition forces in Afghanistan.

A chemical-weapons team discovered early this month what were thought to be traces of chemical agents at three sites in the air base at Khanabad, near the city of Karshi. Military officials speculated that chemicals had seeped from old weapons caches stored by the former Soviet Union.

U.S. troops had been evacuated from hot areas at the base, which had served as a launching pad for the U.S.-led war in Afghanistan late last year.

King said the Army Biological Chemical Command in Edgewood, Md., completed detailed testing and analyses of samples taken at the Uzbekistan base and did not find any presence of chemical or biological weapons.

He said an in-depth analysis of soil, wood and concrete samples, as well as chemical-detection kits, found mostly organic compounds.

He said some of the compounds used to treat lumber share certain common traits with chemical munitions, and the lumber used to construct the base's facilities could have triggered a positive reading in the tests earlier this month.

King said a team also had inspected the U.S. military base at Kandahar, the former spiritual stronghold of the Taliban, and had found no traces of chemical or biological weapons. He said the team was heading to Bagram Air Base, after last checking the command post in November.

Moscow Times
June 24, 2002
Pg. 4

Iran Nuclear Bomb

MOSCOW (AP) -- A top Russian nuclear official on Friday angrily rejected claims that Russia's deal to build a nuclear reactor in Iran might help the Iranian government build a nuclear bomb and insisted that the project envisages the return of all spent nuclear fuel to Russia.

The United States has voiced strong concerns about the \$800 million deal to build the 1,000-megawatt pressurized water reactor in Bushehr, saying that it could help Iran develop nuclear weapons.

Russia has brushed off the U.S. complaints, saying that the reactor can only be used for civilian purposes and will remain under the supervision of the International Atomic Energy Agency.

The Greenpeace environmental group claimed Friday that Russia hadn't yet reached an agreement with Iran on the return of the spent nuclear fuel from Bushehr, citing an internal document of the Nuclear Power Ministry. "That would allow Iran to use the spent fuel to produce plutonium and might help it build nuclear weapons in the near future," the environmental group said in a statement. Deputy Nuclear Power Minister Valery Lebedev dismissed Greenpeace's claim, saying that the contract with Iran provides for the return of all spent nuclear fuel. "The contract says that we will take the spent nuclear fuel back, and we will carry it out," Lebedev said at a news conference.

Aerospace Daily
June 24, 2002

Nuclear Reduction Plan Maintains Future Flexibility, Official Says

The Bush Administration's planned reductions in the U.S. nuclear arsenal, combined with the retention of most of the related delivery systems, will help preserve flexibility in dealing with an uncertain security environment, according to a defense official.

Under the Administration's plan, which was announced earlier this year following a congressionally mandated nuclear posture review, the U.S. will reduce its strategic arsenal of deployed nuclear weapons from about 6,000 warheads to between 1,700 and 2,200 weapons by 2012.

In addition, the Department of Defense (DOD) will eliminate the Peacekeeper intercontinental ballistic missile (ICBM), reduce the Trident sub fleet from 18 to 14, and eliminate the requirement for the B-1 bomber to carry nuclear weapons.

However, the rest of the current structure of 500 ICBMs, 75 B-52s, and roughly 20 B-2 bombers will be retained, the official said, to preserve strategic flexibility and delay the need to invest in new systems.

"We don't know who the opponents of the future are going to be," the official, who spoke on the condition he not be named, said during a luncheon on Capitol Hill June 21. "How many of us, last year at this time, would have been saying that we would be in war in Afghanistan? The thought was, the retaining of existing platforms, and taking the reductions essentially by downloading warheads, gave us enormous flexibility in terms of responding to the security environment. We also, frankly, wanted to avoid, or put off the necessity to invest in new systems."

The warhead reductions will occur in measured stages, the official said, with periodic re-evaluations. A tentative midway point the Administration is aiming for is to reduce the force to approximately 3,800 deployed warheads by 2007. "We'll make decisions in subsequent years as to where we will be, and what the exact composition of the force will be ... as we move towards 2012," he said.

Another factor shaping the reduction schedule, he said, is the need to preserve a level of weapons that will be sufficient to dissuade smaller potential adversaries from building up their own stockpiles to match it.

America's new "nuclear triad" will include the bomber fleet, land-based ICBMs, and sea-launched ballistic missiles (SLBMs). To help maintain the country's nuclear infrastructure, which has "substantially atrophied" over the last eight years, according to the official, the DOD has funded a number of life-extension programs, including one for the Trident D-5 ballistic missile.

Sept. 11, the official said, was a "wake-up call" that showed either countries sponsoring terrorism, or terrorist organizations themselves, could be willing to use weapons of mass destruction against the U.S. population. In such an event, "as horrific as Sept. 11 was, we could be looking at one, two, or three orders of magnitude greater loss of life, damage, economic disruption, and the like," he said. "Waiting around for that to happen, to provide a justification for acting against it, is just not acceptable."

Despite this, one should not assume that the Administration would immediately resort to the pre-emptive use of nuclear weapons against such adversaries, he said.

"The way to think about this is that we ought to maintain a broad range of options for dealing with this problem of weapons of mass destruction," he said. "We ought to be improving our advanced conventional capabilities for dealing with this problem. We ought to have new kinds of capabilities, like missile defenses, for dealing with this problem."

However, "obviously, offensive preemption is one of the things that are in that tool kit," he said. "We don't want [adversaries] to think that they have a free ride to strike first. That would not promote deterrence."

-- *Jefferson Morris*

New York Times

June 23, 2002

Pg. 1

Anthrax In Mail Was Newly Made, Investigators Say

By David Johnston and William J. Broad

WASHINGTON, June 22 -- Scientists have determined that the anthrax powder sent through the mail last fall was fresh, made no more than two years before it was sent, senior government officials said. The new finding has concerned investigators, who say it indicates that whoever sent the anthrax could make more and strike again. Establishing the age of the anthrax that killed five people has strengthened the theory that the person behind the mailings has a direct and current connection to a microbiology laboratory and may have used relatively new equipment. "We're still looking for someone who fits the criteria of training, knowledge, education, experience and skill," a government official said.

The new finding casts serious doubt on another theory that had complicated the so far fruitless investigation: that the culprit had stolen or somehow obtained an old laboratory sample of powdered anthrax, from a strain first identified in 1981.

The dating of the anthrax as recent suggests that the person who mailed it prepared the germs on his own and has the ability to make more without relying on old material, possibly taken from the small supplies of anthrax that the government keeps for testing new kinds of defenses against dangerous microbes.

"It's modern," one official said. "It was grown, and therefore it can be grown again and again."

Officials said the F.B.I. determined that the anthrax was fresh by radiocarbon dating, a standard means of estimating the age of biological samples. It measures how much radioactive carbon a living thing has lost since it died or, in the case of anthrax spores, since they went into suspended animation.

As the case now stands, investigators say they believe that the mailer, if ever caught, will fit the profile offered by F.B.I. behavioral scientists, who theorize that the anthrax killer is a male loner with a scientific bent and a grudge against society, a man who feels comfortable in the Trenton area, where the letters were postmarked. The investigators are uncertain whether the perpetrator is American or foreign.

The new forensic evidence about the anthrax, a germ of domestic origin usually referred to as the Ames strain, has been closely held among investigators. Laboratory experts and senior investigators will meet this coming week with the F.B.I. director, Robert S. Mueller III, to discuss the evidence in the case. Among the topics will be the results of months of sophisticated studies conducted on the anthrax contained in the letter sent on Oct. 9, 2001, to Senator Patrick J. Leahy, Democrat of Vermont.

Even though they are making progress in the science of anthrax, officials acknowledge that they have no prime suspect and have not narrowed the list of possible subjects, which in fact appears to be expanding. Investigators have a list of about 50 people, which is updated periodically as possible subjects are added or deleted.

The Leahy letter, which investigators say holds new promise in their search, was the only one of the four letters recovered in the case that contained enough anthrax to permit extensive scientific testing. The sample retrieved from the envelope addressed to Mr. Leahy, chairman of the Judiciary Committee, at his Senate office address contained as much material as a sugar packet and weighed about a gram.

Along with earlier tests that showed the anthrax was an extremely fine powder that hung dangerously in the air, the scientific studies represent the leading edge of an investigation that has expanded far beyond the F.B.I.'s investigative norms. No active criminal case has a higher priority. The inquiry has consumed millions of dollars and vast amounts of manpower.

Under heavy pressure from Congress and the Bush administration to produce results in the country's first case of deadly bioterrorism, Mr. Mueller has presided over what has expanded into the bureau's second-biggest case after the investigation of the Sept. 11 attacks.

The anthrax case offers a glimpse into what may be the future of criminal investigation on a vast scale in an age of biological and other sophisticated forms of terrorism. The F.B.I. has collected huge amounts of personal information on hundreds of thousands of American citizens, combining it with a scientific arm that has moved far ahead of the Bunsen burners, fingerprints and microscopes of conventional forensic sleuthing.

The F.B.I. and the Postal Service, its partner in the case, have turned to experts beyond their own laboratories. A new high-level containment laboratory to hold deadly germs and a backup unit have been built at the Army's biodefense research facility at Fort Detrick, Md.

Scientists at laboratories in Massachusetts, Ohio, Utah and elsewhere have invented new protocols and tests to probe the molecular structure of the anthrax -- a task complicated by the possibility that the culprit could be among the microbiologists assisting the F.B.I.

Officials say every investigative technique available to the F.B.I. has been used in the case, including round-the-clock surveillances, eavesdropping and searches conducted under the Foreign Intelligence Surveillance Act. Agents have conducted 5,000 interviews and served more than 1,700 grand jury subpoenas.

Hundreds of people have been polygraphed. Investigators have compiled minute-by-minute chronologies of the lives of some subjects, examining their whereabouts when the letters were sent. Forty of the F.B.I.'s 56 field offices and many of its 44 overseas legal attaches have been asked to help. The F.B.I. has established 112 separate databases to store information about the case.

The scale of the investigation and the lack of progress in finding a suspect have prompted a number of people to criticize the F.B.I.'s approach to the case. These people, many of them science experts, have prodded the bureau to move more aggressively, unsuccessfully pushing it to narrow its focus.

So far, even the offer of a \$2.5 million reward has failed to produce a breakthrough lead -- even though in one case last fall, investigators said they were convinced they had their culprit. They passed the word of a pending arrest up the chain of command to President Bush, but their hopes were dashed when their quarry proved innocent. "We just can't seem to catch a break," one government official said.

One group under scrutiny is the biopesticide industry, a group of eight primary companies that has produced a list of about 80 people who remain under investigation. Another group is the biopharmaceutical industry, a larger sector of more than 100 companies, which has produced a list of about 200 possible subjects. Finally, public and private laboratories with anthrax inventories or production capability account for another group of about 50 people who are under suspicion.

Military laboratories not only had the germ, investigators reasoned; they also had the knowledge of how to turn Ames into a dry powder that would float as a lethal cloud for easy dissemination -- exactly as the anthrax in the tainted letters had done.

One focal point of the F.B.I. inquiry was the Dugway Proving Ground in the Utah desert, an Army facility where scientists made powdered forms of anthrax to test decontamination methods. The Fort Detrick biodefense laboratory also came under scrutiny. But experts at Fort Detrick bristled openly at the idea of complicity. Arthur M. Friedlander, a senior scientist there, said the researchers used wet anthrax and had no idea how to make dry powders.

As part of the inquiry, agents are questioning scientists about the possibility that lax security at Fort Detrick allowed someone to smuggle out a pilfered sample of the Ames strain and refine it at home or elsewhere.

Luann Battersby, a microbiologist who worked at Fort Detrick from 1990 to 1998, said two F.B.I. agents interviewed her for three hours on June 12 about the smuggling theory. "I said it was extremely easy to do," she recalled. "A quarter-million micro-organisms fit in the period at the end of a sentence. It doesn't take any great strategy to take this stuff out."

Investigators have repeatedly failed to find evidence of foreign involvement in the letter attacks. Early on, Iraq was a prime suspect. But investigators found no evidence that Baghdad ever obtained the Ames strain and no signs of Iraqi chemical signatures in the powdered anthrax sent to the Senate.

Suspicious of foreign ties remain a matter of serious debate in Washington, not only in intelligence circles but in the White House and Congress. Representative Mike Pence, an Indiana Republican whose office was contaminated by traces of anthrax last fall, wrote a letter to Mr. Ashcroft on June 11 saying he was troubled by the F.B.I.'s "apparent lack of progress" and focus on domestic suspects to the exclusion of foreign sources.

In an interview, Mr. Pence said he learned from an F.B.I. briefing last week that investigators were having trouble scrutinizing possible foreign links because some countries were not cooperating. "They're leaving no stone unturned on the domestic front," he said. "But there are some stones they can't flip overseas."

One senior official said of the overseas inquiry: "It's more problematic and difficult. Some countries aren't going to tell you anything."

As the F.B.I. investigation has appeared to get no closer to finding a suspect, amateur sleuths and self-appointed experts have rushed in to fill the void and draw conclusions that they maintain the F.B.I. has missed.

Dr. Henry Kelly, president of the Federation of American Scientists, a private group in Washington that is studying the anthrax puzzle, defended these outsiders as playing an important role by asking the government tough questions.

"It's astounding that they haven't been able to narrow the field," he said of federal investigators. "There aren't that many people that could have been involved."

Most of these outsiders know their detective work stands little chance of finding the culprit, and instead hope to pressure federal authorities into pursuing lines of inquiry that otherwise might be ignored.

Like federal authorities, they too disagree on whether the most likely suspects are foreign or domestic. In March, officials at the Johns Hopkins University Center for Civilian Biodefense Strategies argued publicly that one of the Sept. 11 hijackers, Ahmed Alhaznawi, who went to the emergency room of a Florida hospital with a skin infection last year, probably had a form of anthrax -- raising the odds that Islamic militants might be behind the letter attacks. A more popular theory holds that the culprit is a federal laboratory insider who meant not to kill but to alert the nation to terrorist dangers. In this view, the mailer saw himself as a kind of superpatriot, pointing out weaknesses in the country's biodefenses.

Dr. Kelly said the F.B.I might have a likely suspect in mind -- although law enforcement officials deny that they have singled out anyone.

"It's entirely possible they have a good idea who the person is but don't have a good case," Dr. Kelly said. "If I had to guess, that's where I'd say they are."

Strands of the Anthrax Investigation

The F.B.I.'s investigation of last fall's fatal anthrax letters has become the bureau's single biggest criminal case apart from the Sept. 11 attacks.

Major Focal Points Of The Investigation

DUGWAY PROVING GROUNDS, UTAH -- Current and former employees have been given polygraph tests.

FORT LAUDERDALE, FLA. -- Ahmed Alhaznawi, one of the Sept. 11 hijackers, was treated for an anthrax-type infection at an emergency room here in June 2001.

AREA AROUND TRENTON -- Agents have distributed fliers, checked photocopiers that could have been used to copy the letters and crosschecked anyone who sought prescriptions for Cipro with people known to have been in the area.

F.B.I. HEADQUARTERS -- Agents have assembled databases of information on suspects and are coordinating the activities of agents in 40 F.B.I. domestic field offices as well as offices abroad.

FORT DETRICK, MD. -- Current and former employees of an Army lab have been given polygraph tests. A new lab has been built to hold anthrax samples gathered in the investigation.

Other Avenues

ANTHRAX-CAPABLE LABORATORIES -- Agents have investigated labs that either had the ability to make anthrax or had an inventory of the strain identified in last fall's letters.

ANTHRAX-RELATED EQUIPMENT MANUFACTURERS -- Investigators have compiled lists of thousands of manufacturers of specialized equipment needed to make anthrax.

COMPANIES' STOCK PRICES -- Multi-agency financial review unit examined the stock prices of more than 100 companies for unusual trading.

Baltimore Sun
June 22, 2002

Russia Plans To Build, Refurbish Nuclear Reactors

MOSCOW - Russia is confronting its growing energy shortage with an ambitious program of refurbishing old nuclear reactors and building at least four new ones, top government nuclear officials said yesterday.

The expansion of Russia's nuclear program comes after years of stagnation resulting from the Chernobyl disaster in 1986, when a reactor at the Ukraine plant exploded, sending a radioactive cloud over much of Europe. The explosion, the world's worst nuclear accident, is believed to have killed thousands from radiation-related illnesses.

Boston Globe
June 21, 2002
Pg. 18

Missing: Soviet Radioactive Dust

By Gareth Cook, Globe Staff

Specialists tracking the world's radioactive material revealed a new concern yesterday: a highly radioactive powder, used by the Soviets, whose location is currently unknown.

The Soviet Union used the substance in a bizarre series of agricultural experiments, the specialists said, a disclosure that raises concerns that terrorists could acquire the powder and use it to fashion radioactive "dirty bombs."

Although details about the program remain murky, a spokeswoman for the International Atomic Energy Agency in Vienna said yesterday that it had received reports of the program from "reliable sources" in Russia, as well as photos of trucks used to move the powder around. The agency is alarmed because the powder is highly radioactive, easily dispersed, and unaccounted for.

"It is the post 9/11 era, and we don't want this stuff to get in the wrong hands," said Melissa Fleming, the IAEA spokeswoman.

Fleming said that the United States and Russia will announce Tuesday a joint two-year program to locate and secure radiation sources that authorities lost track of when the Soviet Union fell apart, and that finding the powder will be one of their priorities. The joint program, which will be managed by the IAEA, will receive about \$40 million, according to an article in today's issue of the journal *Science*, which also reported the existence of the agricultural program.

An advance copy of the *Science* article was provided to journalists yesterday.

The material used by the Soviets was a form of cesium-137 called cesium chloride, Fleming said. According to IAEA's sources, the radioactive powder was placed in the back of a truck, with heavy lead shielding to protect the driver, and driven over fields, to expose planted seeds to radiation.

The precise purpose of the experiments is unclear, as is their timing, Fleming said. Exposure to radiation would cause random genetic changes in the seeds.

The experiments were abandoned, Fleming said, but it is not known what was done with the radioactive material. Such material becomes less powerful over time, but cesium-137 decays slowly, losing half of its potency about every 30 years.

The security of radioactive material has been an increasing concern, especially since the US government announced earlier this month that it had disrupted a plot to explode a radioactive bomb in the United States.

New York Times
June 25, 2002

New Command Would Meld Missile Defense And Offense

By Eric Schmitt

WASHINGTON, June 24 — The Pentagon plans to create a new command that combines the military network that warns of missile attacks with its force that can fire nuclear or nonnuclear weapons at suspected nuclear, chemical and biological weapons sites around the world, administration officials said today.

The command would fit neatly into the Bush administration's new doctrine of pre-emptive action against states and terrorist groups that are trying to develop weapons of mass destruction, officials said.

Defense Secretary Donald H. Rumsfeld and Gen. Richard B. Myers, chairman of the Joint Chiefs of Staff, have briefed President Bush on the plan in recent days. Top aides say it is near certain to be approved.

Under this proposal, the United States Space Command would merge with the United States Strategic Command. Earlier this year, the Pentagon created a new Northern Command to coordinate responses to terrorist attacks within the nation's borders, and this new step is viewed as another effort to revamp the military's structure to be more responsive to terrorist threats.

The new command would probably be based at Offutt Air Force Base near Omaha. It would harness in one entity the nation's missile warning network and the new national missile-defense system now breaking ground, as well as the country's ability to plan and launch offensive strikes with nuclear and conventional weapons.

"There's a logic in taking these two commands with important global reach, and pulling together people who can think globally," a senior administration official said.

Right now, the Space Command in Colorado Springs is responsible for overseeing a constellation of satellites and ground sensors that warn commanders of missile launchings around the globe, and for protecting military computer systems against viruses and other attacks. It has about 750 civilian and military employees, and is headed by Gen. Ralph E. Eberhart of the Air Force.

The Strategic Command, at the Offutt base, oversees the nation's arsenal of nuclear missiles, which could be fired from submarines, long-range bombers or from underground silos. It has about 1,800 employees and is headed by Adm. James O. Ellis Jr., who is expected to be nominated to head the new command.

To adjust to the changing nature of warfare, military officials say it makes sense to merge the two independent commands.

During the cold war, the United States used the threat of nuclear attack to deter a Soviet attack on Western Europe.

But the Pentagon's Nuclear Posture Review, the military's blueprint for developing and deploying nuclear arms, concluded this year that the country faces new contingencies in which nuclear weapons might be used, including "an Iraqi attack on Israel or its neighbors, or a North Korean attack on South Korea."

A theme in the report, and a planning responsibility of the Strategic Command, is possible use of nuclear arms to destroy enemy stocks of biological weapons, chemical arms and other arms of mass destruction. Planners say the new command would expand work in this area.

But the Pentagon's new nuclear-deployment blueprint also found that long-range conventional weapons were becoming an increasingly important element of the military's arsenal. Precision-guided weapons have made up about 60 percent of all munitions in the war in Afghanistan, and their effectiveness was about 90 percent, officials said.

The Pentagon has asked Congress, for example, for money to convert four Trident submarines so they can fire conventional Tomahawk cruise missiles. The submarines now carry long-range nuclear-tipped missiles.

Advocates say the new command could either plan and execute its own missions — by deploying B-2 bombers armed with satellite-guided bombs from this country, for example — or assist regional commanders in their battle planning for a campaign like the one in Afghanistan.

The new command, which does not yet have a name, would also be responsible for developing the military's increasing efforts in information warfare, especially defensive measures to thwart computer hackers, as well as secret offensive operations aimed at crippling an adversary's computers.

In some measure, the merger is also intended to make a virtue out of a necessity. Mr. Rumsfeld opposes an increase in the overall number of regional commanders in chief, or cincs. The creation of the new Northern Command made consolidating at least two commands inevitable, officials said. The Space Command became the logical candidate when the Pentagon decided to align the Northern Command with the separate North American Aerospace Defense Command, the American-Canadian alliance known as Norad that defends the countries against air and missile attacks. General Eberhart is the head of Norad and has been nominated to head the new Northern Command.

General Myers, a former head of the Space Command, said on April 17 when the Northern Command was officially announced that the Pentagon had also commissioned a study on merging the Space and Strategic Commands.

Critics contend that the two commands have distinct cultures that will be difficult to mesh, even though much of the space operations will remain in Colorado. Other senior military officers have expressed concern about how the new command will coordinate with Norad on crucial issues of domestic defense.

But most Pentagon, Congressional and outside experts largely agree that for practical and long-term strategic reasons, the merger makes sense.

"Both are commands that don't have a whole cinc's-worth of work to do," said Ashton B. Carter, a professor at Harvard's Kennedy School of Government and a former assistant defense secretary in the Clinton administration.

"Combining them creates a cinc-dom that has a respectable amount of mass."

Washington Post

June 25, 2002

Pg. 15

U.S. And Russia To Protect 'Dirty Bomb' Materials

By Peter Slevin, Washington Post Staff Writer

The Bush administration, moving beyond the protection of nuclear materials, expects to spend \$20 million this year to safeguard dangerous radiological materials in the former Soviet Union that could be used to make a "dirty bomb," U.S. officials said yesterday.

Scores of radioactive power generators and more than a dozen poorly guarded storage areas for radiological material would be targeted for protection in a joint U.S.-Russian program. The effort comes in response to fears that terrorists could manufacture a radioactive dirty bomb.

The International Atomic Energy Agency is scheduled to release a report in Vienna today that will warn of the dangers of unprotected radiological materials around the world. The IAEA, which has operated a security program in the former Soviet republic of Georgia since 1997, will join the Americans and Russians in part of the expanded effort.

"What this really represents is the first time the international community has begun the development of a concerted and comprehensive plan to address this," a Department of Energy official said yesterday. The administration expects to spend \$20 million this year and seek \$20 million next year to find and protect radiological materials, the official said.

The job is enormous in Russia and the former Soviet states alone, where "orphaned" material is often unguarded. A particular concern is an array of small power sources called radiothermal generators, which deliver power to remote locations, such as a military base or a cliffside beacon.

In the arctic coast in far-northeastern Russia, for example, investigators found virtually no controls over 85 generators installed in the 1960s and 1970s. In Georgia, three woodcutters received serious injuries after finding one of the lead-encased devices in the middle of a forest last Christmas.

"What was previously a hypothetical threat has become a very real concern in light of recent events," Energy Secretary Spencer Abraham said yesterday. He noted that the agreements with Russia and the IAEA are intended to expand the focus to materials in the former Soviet Union "that are most vulnerable to theft and misuse."

Programs to safeguard nuclear material have been underway for years, but the terrorist attacks of Sept. 11 provided new urgency as worries grew that terrorists could acquire the makings of a dangerous bomb, whether with a chunk of highly enriched uranium, a cylinder of radioactive strontium 90 or a quantity of medical isotopes.

Unlike nuclear devices designed to explode, a dirty bomb likely could be constructed by packing radioactive material around conventional explosives. The chief danger would be contamination that could have long-delayed effects.

Moscow Times

June 25, 2002

Pg. 3

Joint Nuclear Hunt

VIENNA, Austria (Reuters) -- The United States and Russia will join forces to hunt down missing radioactive material across the former Soviet Union to prevent it from being used in "dirty bombs," the UN nuclear watchdog said on Monday.

The aim is to recover "orphaned" nuclear material, such as nuclear-powered field generators and radioactive powder left scattered with little regulatory control. The Vienna-based International Atomic Energy Agency said it would manage the search.

Details of the plan were to be announced Tuesday.

Washington Post

June 25, 2002

Pg. 16

Cheney Vows Shutdown Of Terror Camps

By The Associated Press

PORTLAND, Ore., June 24 -- Vice President Cheney vowed today the United States would "shut down terrorist camps wherever they are" and said Iraq's interest in producing weapons of mass destruction is a "gathering danger." A "regime that hates America must never be permitted to threaten Americans with weapons of mass destruction," Cheney said of Iraqi leader Saddam Hussein.

Speaking of the Bush administration's war against Osama bin Laden's al Qaeda network, Cheney said it is not enough for the United States to rely on measures to protect people and buildings in the United States. "Wars are not won on the defensive," Cheney said. "We must take the battle to the enemy."

He said, "We are going to shut down terrorist camps wherever they are" and find terrorists "one by one and bring them to justice."

Cheney said the government has "found confirmation bin Laden and al Qaeda are seriously interested in nuclear, radiological and biological weapons."

Cheney also said Hussein is "clearly pursuing these weapons of mass destruction," a danger requiring "the most decisive response by America and its allies."

Security was tight for Cheney's Portland visit for a fundraising breakfast for Sen. Gordon Smith (R-Ore.).

Baltimore Sun
June 25, 2002

Senate Panel To Investigate Gas Tests On Navy Ships

A Senate panel will investigate whether the Pentagon intended to use American sailors as human guinea pigs during the 1960s testing of chemical weapons aboard Navy ships, Sen. Max Cleland said yesterday.

The Georgia Democrat, who is chairman of the Senate Armed Services personnel subcommittee, said he will convene hearings this fall on the once-secretive testing program that Pentagon officials acknowledged for the first time last month. Cleland says he is pushing for open hearings, but the Pentagon might insist some of the material stay classified.

Military documents indicate two kinds of nerve gas and a biological agent were sprayed on Navy ships in the Pacific from 1963 to 1970 during a series of tests. Officials have told lawmakers that monkeys aboard the ships were the subjects of the most dangerous experiments.

Washington Times
June 26, 2002
Pg. 3

Pentagon Expedites Missile-Defense Plan

By Bill Gertz, The Washington Times

The Pentagon is rapidly moving ahead with deploying a new defense system in the next few years that can knock out enemy missiles, the general in charge of the program said yesterday.

"Our goal is very simple: to defend against limited long-range threats and robustly against shorter-range threats," Air Force Lt. Gen. Ronald Kadish said in discussing the \$48 billion development program.

Meanwhile on Capitol Hill, the Senate debated an amendment that would restore to a defense-spending bill \$800 million that was cut from the missile-defense program. Defense Secretary Donald H. Rumsfeld has said he would recommend a presidential veto if the funding cut is not restored.

The debate has stalled final action on the \$393 billion defense bill, which includes more than \$7.5 billion for missile defense for fiscal 2003.

"Now is not the time to send a signal that we are lessening our resolve to defend this nation from all known threats," said Sen. John W. Warner, Virginia Republican, the ranking member of the Senate Armed Services Committee.

Gen. Kadish briefed reporters on what he called "very aggressive" plans for a layered missile-defense system that can knock out missiles shortly after launch, in space and as they near targets on the ground.

Such a comprehensive system allows for "multiple shots at each phase" of a missile's flight, he said.

"And that's what we're trying to do with our program today — is build this layered system as best we know how to do and as quickly as we could do it against all ranges of threats," Gen. Kadish said.

Recent testing successes using ship-based missile-defense interceptors indicated that a limited, emergency system could be deployed in the next several years, he said.

"We're going to work as hard as we can to deploy our systems as soon as possible," Gen. Kadish said. "And I can't tell you the exact date right now, but we're heading somewhere in the mid-decade time frame, in the four-to-six-to-eight-year time frame of this decade."

Gen. Kadish declined to say a basic missile-defense system could be deployed by 2004. "We walk before we run. You don't try to make a Cadillac when you basically have the knowledge for a Model T," he said.

Intelligence estimates have said North Korea is developing long-range missiles and could have one with enough range to hit the United States by 2004.

Other long-range missile threats are expected by some to emerge in the coming years from Iran, Iraq and Libya, in addition to the threat of attack posed by Russian and Chinese intercontinental ballistic missiles.

Asked about the North Korean missile threat, Gen. Kadish said, "We will have a test bed by 2004 that could have some emergency capability against long-range threats from North Korea."

Other advanced missile-defense systems being worked on include a laser mounted in a Boeing 747, a space-based laser gun and a "hit-to-kill" weapon that would hit missiles shortly after launch.

"And those technologies are being aggressively pursued, although not with a lot of money in our budget allocation this year," Gen. Kadish said. "But we'll be ramping up rather quickly."

The general declined to say how much it will cost to deploy a national missile defense and said that until the system is clearly defined, it will be very hard to estimate. However, he noted that the system will be very expensive.

Gen. Kadish said the Pentagon plan calls for deploying a missile-defense system "as quickly as possible" and then improving the system over time with features that will be able to defeat foreign efforts to thwart the system.

Colorado Springs Gazette

June 26, 2002

Space Command Leaving Springs

Merger with Strategic Command will send headquarters to Nebraska

By John Diedrich, The Gazette

Secretary of Defense Donald Rumsfeld is expected to announce today the merger of Colorado Springs-based U.S. Space Command and U.S. Strategic Command with the headquarters going to Nebraska.

Rumsfeld called Sen. Wayne Allard, R-Colo., on Tuesday night to tell him the merger will happen, said Sean Conway, spokesman for Allard. "It has been signed off and is official," Conway said. For months, the military studied combining Space Command, which controls the nation's satellites, directs cyber warfare and could be the future home of missile defense, with Strategic Command, the outfit in charge of U.S. nuclear missiles.

The command will go to Offutt Air Force Base near Omaha, which is the home of Strategic Command, Conway said. The move will allow the Pentagon to put its missile warning and offensive capability under one command. It also cuts military bureaucracy, a priority for Rumsfeld.

The merger likely will cost Colorado Springs no more than half of U.S. Space Command's 800 jobs. The loss will be offset by the arrival in October of Northern Command, which will be responsible for policing U.S. sea, land and air from attack. Northern Command, which will mean 500 to 1,000 jobs, is going to Peterson Air Force Base, pending an environmental study.

The merger isn't expected to pull Air Force and Army space commands, which together have a more than \$8 billion budget, out of Colorado Springs. The city will continue to be the military space capital. "This doesn't take the shine off the prestige of Colorado Springs," said one congressional staffer who asked not to be named.

The merger was considered once before. In 1993, a study concluded the merger wouldn't save much money. It also noted Canadians, the United States' partner in the North American Aerospace Defense Command, would object to being in the same organization that commands offensive nuclear weapons. NORAD has been under the same commander as U.S. Space Command since the mid-1980s. But now NORAD will be paired with Northern Command, making the Canadian concern moot.

Most importantly, Space Command and Strategic Command overlap, a Pentagon memo said. That factor, not money, is the reason for a merger.

Agency Says 'Dirty Bomb' Could Be Made in Any Country

By SERGE SCHMEMANN

UNITED NATIONS, June 25 — The International Atomic Energy Agency said today that virtually any country in the world had the radioactive materials needed to build a "dirty bomb," and that more than 100 of these countries had inadequate controls to prevent their theft.

The agency, an arm of the United Nations, said in a news release issued at its headquarters in Vienna that "orphaned" radioactive materials — those outside regulatory control — were a "widespread phenomenon" in the former Soviet Union.

The agency said that on June 12, some of its officials met with others from the Department of Energy and the Russian Ministry for Atomic Energy to develop a coordinated strategy to locate and secure the orphaned sources. A dirty bomb is one in which radioactive materials are dispersed through a conventional explosion to spread radioactivity.

Since the terror attacks of Sept. 11, fears have grown that terrorists could deploy a dirty bomb. Earlier this month, the United States announced that an American citizen who had converted to radical Islam had been detained on suspicion of planning to build and detonate such a device.

According to the atomic energy agency, radioactive materials that could be used in a dirty bomb are widely used throughout the world for a variety of purposes, from the treatment of illnesses to irradiating food. Though most are too weak to cause serious radiological harm, the agency said industrial radiography, radiotherapy, industrial irradiators and thermo-electric generators use highly radioactive materials like cobalt 6, strontium 90, cesium 137 and iridium 192.

"What is needed is cradle-to-grave control of powerful radioactive sources to protect them against terrorism or theft," the director-general of the agency, Muhammad el-Baradei, said in the statement. "One of our priorities is to assist states in creating and strengthening national regulatory infrastructures to ensure that these radioactive sources are appropriately regulated and adequately secured at all times."

The agency noted that there has already been one attempt at radiological terror. In 1996, Chechen rebels placed a container of cesium 137 in a Moscow park, but the material was not dispersed.

Though the largest problem was in the former Soviet Union, the agency noted that even the United States Nuclear Regulatory Commission has reported that American companies have lost track of nearly 1,500 radioactive sources since 1996, and more than half were never recovered. A European Union study estimated that about 70 radioactive sources are lost every year from regulatory control. Most of these, however, would not pose a serious threat in a dirty bomb.

Nuclear Nonproliferation: U.S. Efforts to Help Other Countries
Combat Nuclear Smuggling Need Strengthened Coordination and Planning.
GAO-02-426, May 16.

<http://www.gao.gov/cgi-bin/getrpt?GAO-02-426>

New York Times
June 26, 2002

Search Of Biologist Is Uneventful

By David Johnston

WASHINGTON, June 25 — Federal authorities today searched the home of a biologist who has done work on germ defenses for the government, but they found no evidence linking him to the mailing of deadly anthrax spores, law enforcement officials said today.

Agents of the Federal Bureau of Investigation examined the apartment of Dr. Steven J. Hatfill near Fort Detrick, Md., after he consented to the search, the officials said. They had said before the search that Dr. Hatfill was not a suspect, and today's results seemed to strengthen that position.

Dr. Hatfill, 48, had been the subject of Web site gossip among scientists, journalists and other professionals about possible domestic suspects in last year's anthrax attacks. After reporters pursued him, he was fired in March from his job at Science Applications International Corporation, a contractor for the Pentagon and the Central Intelligence Agency that helps the government with germ defenses. From 1997 to 1999, he worked at the Army's biodefense laboratory at Fort Detrick.

In an interview, Dr. Hatfill said he had been the victim of a witch hunt.

"I've got a letter from the F.B.I. that says I'm not a suspect and never was," he said. "I just got caught up in the normal screening they were doing, because of the nature of my job."

A senior law enforcement official said Dr. Hatfill was one of several people on a floating list of subjects who, upon close examination, fade from view. Such people, who have also agreed to consensual searches, come and go as new information alters the picture of what is known and believed, the official said.

The bureau's investigation has failed to identify who was responsible for the anthrax-laced letters sent to two senators and the news media last fall. Five people were killed by the anthrax, and 13 others were infected.

Washington Post
June 26, 2002
Pg. 16

Foul-Ups Mar Effort On Nuclear Materials

U.S. Anti-Smuggling Program Criticized

By Guy Gugliotta, Washington Post Staff Writer

U.S. efforts to control the smuggling of nuclear and radioactive material in foreign countries are poorly coordinated and haphazardly administered, resulting in foul-ups that have left needed equipment idled in packing crates, sometimes for years, congressional investigators said.

Nonetheless, the investigators said in a new report, these international programs are in many cases more substantial than the safeguards at domestic borders, where U.S. Customs Service inspectors rely mostly on hand-held pagers to detect radioactive material.

"It's a pretty damning report," said Sen. Pat Roberts (Kan.), ranking Republican on the Senate Subcommittee on Emerging Threats and Capabilities. "Quite a few of us have been working on this for several years, and we had some suspicions. The report confirms them."

The study was produced at Roberts's behest by the General Accounting Office, Congress's investigative arm, and is scheduled for release today. The Washington Post obtained a copy in advance.

The study examines programs administered by six federal agencies that spent \$86 million in about 30 countries between 1992 and 2001 to help them monitor and control the movement of radioactive materials that could be used in nuclear weapons or radiological bombs, known as "dirty bombs."

The assistance, mostly to Russia, former Soviet republics, and Central and Eastern European countries, is used to buy detection devices and other equipment, technical assistance and training.

The investigators found that no agency coordinated the programs, resulting in the absence of an overall strategy, duplicate bureaucracies and marked differences in the quality of equipment given to different countries. The report noted that the Defense and Energy departments gave Russia and another country sophisticated monitors that could read neutron emissions -- critical in detecting the presence of plutonium, a key component of nuclear weapons. The State Department installed monitors in several other countries that did not have the capability. The report also said that the State and Energy departments run two programs each and that the two Energy Department administrators don't communicate with each another even though they fund the same equipment. The other agencies that provide anti-smuggling assistance are Customs, the FBI and the Coast Guard. "The current multiple-agency approach . . . is not, in our view, the most effective way to deliver this assistance," the report said. "We believe the development of a government-wide plan is needed." The report also criticized the lack of bureaucratic follow-through on how the assistance was used once it had been delivered. The investigators said the Defense Department reported early this year that much U.S.-supplied equipment either had never been used, had been used only to impress visiting Americans or was idle because it needed new batteries or repairs. The report also noted that several State Department-supplied vans with radiation detection equipment had been idled because they couldn't be operated in cold weather or because they were too expensive to supply with fuel. The vans cost about \$90,000 each. In Estonia, \$80,000 worth of equipment was stored in an embassy garage for seven months while an agreement to release it was negotiated. In Lithuania, the U.S. Embassy stashed radiation detectors in the basement for two years until the United States and Lithuania agreed on the purchase of a \$12,600 power supply. Roberts said the GAO included Customs' information on domestic U.S. surveillance as a supplement to the main report, because Customs was late in responding to the GAO's request for information. Customs said its 7,500 inspectors had 4,200 radiation pagers -- the simplest of detection devices -- but planned to equip everyone by September 2003. Customs also said it had deployed 200 detectors in vans as well as other X-ray equipment for small packages.

Wall Street Journal
June 26, 2002

U.N. Warns About 22,000 Machines Vulnerable To 'Dirty-Bomb' Efforts

By John J. Fialka, Staff Reporter of The Wall Street Journal

WASHINGTON -- Poor controls and weak regulations governing radioactive materials mean that more than 22,000 machines that use them are vulnerable to terrorist efforts to make a "dirty bomb," according to the International Atomic Energy Agency.

The new study by the Vienna-based affiliate of the United Nations came out as U.N. nuclear experts said they failed to find a set of highly dangerous nuclear batteries orphaned in Georgia after the breakup of the Soviet Union. The loss highlighted the growing problem of missing nuclear material used to make dirty bombs.

The agency's study found that in more than 100 countries there are no minimum standards in place to control radiation sources. Even in industrial countries that have some controls, there are large amounts of "orphaned" or missing materials, says the agency. It lists radiotherapy units in hospitals, industrial radiography equipment and food irradiators as the most potent and troublesome sources.

Orphaned radioactive materials are a "widespread phenomenon" in the states of the former Soviet Union, the report said. It noted that a recent study by the European Union found 30,000 used radiation devices in storage and "at risk of being lost."

The batteries from Georgia, palm-size canisters brimming with highly radioactive strontium-90, were once used as electric generators for communications systems that lie off the power grid. Six of the devices have been recovered, and the final two were the subject of an intensive 80-man search that was directed by an international team of experts, who fanned out over a 350-square-mile stretch of wilderness.

In the U.S., the Nuclear Regulatory Commission has reported that companies have lost about 1,500 radioactive sources since 1996 and more than half were never recovered.

A dirty bomb, or a "radiation dispersal device," uses conventional explosives to spread radioactive wastes over a large area. While immediate casualties are likely to be relatively low, there could be longer-term cancer risks and property risks involved because the resulting radioactive mess could take months or years to clean up.

The IAEA found that there are millions of radioactive sources in use around the world, but "only a small percentage" have dirty-bomb potential. "What is needed is cradle-to-grave control of powerful radioactive sources to protect them against terrorism or theft," said Mohamed ElBaradei, director general of the agency.

Mark Gwozdecky, a spokesman for the agency, cautioned that much speculation in the press about the threat posed by dirty bombs has been "based on bad science and really alarmist."

Potential terrorists face formidable risks in trying to steal and handle dangerously radioactive material, and then face the added difficulty of making a bomb that effectively disperses the material over a large area. "Imagine taking a bowling ball and trying to break it up into tiny little bits," said Mr. Gwozdecky.

But the agency has counted 263 incidents of theft of radioactive sources since 1993, most of them involving "small time crooks in hope of profit," he said. The relatively new threat of suicide bombers, he added, means that more controls are necessary. "And we believe the number of cases we've recorded vastly underestimates the scale of the problem," he said.

Tom Ridge, director of President Bush's Office of Homeland Security, told a House Energy subcommittee here Tuesday that one of the missions of his agency and the future Department of Homeland Defense will be to set standards for effective radioactivity detection equipment and to provide a "point of access" in government for industries that make them or want to use them.

"We can't dictate the kinds of equipment they must purchase," said Mr. Ridge. He said the government would set standards to make sure that detectors are effective and measure consistently.

K. David Nokes, an official of Sandia National Laboratories, told the panel that simple Geiger counters aren't effective because they detect many different types of radioactive materials, raising the prospect of many false alarms.

His laboratory, he said, has come up with a detector that can "zero in" on materials that may pose a threat at airports and international ports. The device, called a "Radiation Assessment Identification and Detection System," could be produced at less than \$50,000 per unit and can identify a radioactive source even if its radiation is shielded, he said.

Jerusalem Post

June 26, 2002

Ben-Eliezer: World Ignoring Iranian Nuclear Threat

By Tovah Lazaroff

Among the elements threatening to destabilize the region is an expected US attack on Iraq, the build-up of nuclear weapons in Iran, Hizbullah's conventional military arsenal, and Palestinian Authority Chairman Yasser Arafat, Defense Minister Binyamin Ben-Eliezer told the Jewish Agency's Board of Governors last night in Jerusalem. Once the US focuses on destroying Iraq, Israel will be one of Iraq's first retaliatory targets, Ben-Eliezer said, and they have the weapons to do us harm. Israel is working with the US to overcome any damage from such an attack, Ben-Eliezer said.

However, Iran, which borders Iraq, also has missiles. They can reach almost anywhere in Israel, most notably the densely-populated center of the country, Ben-Eliezer said.

Iran will have nuclear capability within three or four years, the defense minister noted.

"The whole world is sleeping while Iran builds a core nuclear infrastructure that is going to do something bad to the interests of the world," Ben-Eliezer added.

Hizbullah has grown from a tiny terrorist organization to one that has 10,000 katyushas and hundreds of long-range missiles and rockets. They are supported by Syria and are one of the main terror threats today.

"They are trying to escalate the situation in the North and we are doing everything not to let that happen," Ben-Eliezer said.

"The strategy of restraint is a must. We want to concentrate on the struggle with the Palestinians."

It's clear that Arafat is trying to escalate the conflict with Israel into a regional one, Ben-Eliezer said. The leaders of Jordan, Saudi Arabia, and Egypt believe this is Arafat's intention.

"What worries Egypt and Saudi Arabia today are internal problems as the result of the struggle that is happening here, and their consequences upon the stability of the Middle East. They are worried about the Iranian connection. There is a connection between Iran, Syria, Hizbullah, and the Palestinians that could crush Middle East stability," Ben-Eliezer said. He believes US President George W. Bush was correct in telling Syria to stop backing terrorist organizations and in particular Hizbullah.

He added that he spoke last week with the Japanese Minister of Foreign Affairs, who was concerned about the regional conflicts because 82 percent of all industry there is dependent on Middle Eastern oil.

"Increasingly, Europe and Japan realize that the game Arafat is leading might damage the oil producers," Ben-Eliezer. There is room for cooperation between the US, Europe, Russia, and some Arab countries, all of whom want the region to remain stable, Ben-Eliezer said.

"More and more they realize that Arafat is the obstacle and not the solution. More and more nations realize that this is not a conflict just between Israel and the Palestinians, but one that has damaging consequences for the security of the region," Ben-Eliezer said.

In fighting the Palestinians, Israel has a very strong army, but its aircraft and tanks do not help it against the suicide bombers, the defense minister said, citing a macabre joke that it's easier to find a man or woman to volunteer to be a suicide bomber than it is to find the explosives with which to arm them.

Ben-Eliezer said he viewed the speech Bush gave Monday very positively, particularly his focus on the need for a change in Palestinian leadership and the imperative to dismantle terrorist organizations. It must be the start of any negotiation process, Ben-Eliezer said.

"But we should not forget that the president spoke of two nations, the Palestinians and the Israelis. Most of my life has been spent in the military and I can tell you one thing: there is no military solution to this problem. Militarily we are doing quite well... But at the end of the day and I do not know which day we are talking about we have to sit down at the table and negotiate an agreement between both sides. Those who try to ignore that reality are wasting their time. We can not ignore the fact that we are two people living on the same piece of ground," Ben-Eliezer said. Arafat can not be the one that sits down to conduct those negotiations. "Arafat has chosen terror as the main channel to achieve his dream," Ben-Eliezer said.

But there are other more reasonable Palestinians who can become the leaders, and when they step forward, Israel is willing to sit down and begin negotiations to come to a solution acceptable to both sides, he added.

Washington Post

June 27, 2002

Pg. 8

Rumsfeld Announces Merger Of Commands

Defense Secretary Donald H. Rumsfeld announced yesterday that the Pentagon will soon merge the U.S. Space Command and the U.S. Strategic Command into a single new command responsible both for defense against missile attacks on the United States and for long-range conventional attacks against foreign targets.

The new command will be based at Offutt Air Force Base in Nebraska, home of the Strategic Command, which controls the country's nuclear missiles and long-range bomber force. Although Rumsfeld did not say who would head the new command, defense officials indicated that President Bush would likely nominate Navy Adm. James Ellis, who heads the Strategic Command.

Air Force Gen. Ralph Eberhart, head of the Space Command, has been nominated by Bush to head the newly created Northern Command, which will begin directing the military's role in homeland defense on Oct. 1.

Gen. Richard B. Myers, chairman of the Joint Chiefs of Staff and former head of the Space Command, said the merger of Space Command and Strategic Command "will increase the military effectiveness providing the appropriate support to our combatant commanders around the world and, for that matter, responsiveness to the president and to the secretary of defense."

Omaha World-Herald
June 27, 2002

Offutt Will Take Command This Fall

By Jake Thompson, World-Herald Bureau

WASHINGTON - A new major military command will go into operation Oct. 1 at Offutt Air Force Base, defense officials said Wednesday. The new command will assume full operation about a year later.

Defense Secretary Donald Rumsfeld said Wednesday that the merger of U.S. Space Command in Colorado with U.S. Strategic Command at Offutt near Bellevue would form a new regional command, probably at Offutt.

One source indicated that it could retain the name Strategic Command.

An environmental assessment, which probably will take several months, must be completed before Offutt officially wins the new command post.

Although the merged command markedly boosts Offutt's national defense duties, a defense official said the base probably won't see a rash of new building or a rush of people transferring into the metro-Omaha area from Colorado. "It's a plus in both communities on the number of jobs by a small amount," said Lt. Col. Michael Humm, a Defense Department spokesman. "It's definitely not going to be a negative impact."

The Defense Department is studying how many people and how much equipment will need to be transferred to the new command and expects to make that determination by the time it is in full swing, Humm said.

Space Command, which was created in 1985 and has 750 employees, oversees a network of military satellites that provide intelligence, missile warning, navigation and weather information to U.S. troops around the world. It tracks about 8,000 objects orbiting Earth.

Strategic Command, established in 1992 as an outgrowth of the former Strategic Air Command, oversees the nation's arsenal of nuclear-tipped ballistic missiles in underground silos, on submarines and aboard bombers as a deterrent against nuclear war. About 1,800 people are employed at StratCom.

The streamlining drive and the goal to improve the Defense Department's ability to combat new, unpredictable threats worldwide put Omaha on the map in a distinct way.

In April, Rumsfeld announced that Peterson Air Force Base at Colorado Springs, now home to Space Command, would become the home to a new Northern Command overseeing the military's homeland security efforts.

Colorado Springs Gazette
June 27, 2002

U.S. Space Command Out Of Springs In October

By Raquel Rutledge, The Gazette

As Colorado Springs prepares to welcome the nation's new homeland defense command, it will bid farewell to the headquarters of U.S. Space Command, an 800-plus member team stationed at Peterson Air Force Base, Secretary of Defense Donald Rumsfeld announced Wednesday.

Come October, Space Command, which controls the nation's satellites and directs cyberwarfare, will merge with U.S. Strategic Command, which is in charge of U.S. nuclear missiles. The new command, which has yet to be named, likely will be located at Offutt Air Force Base near Omaha, Neb., the home of Strategic Command, Rumsfeld said.

The move is designed to cut bureaucracy and allow the Pentagon to locate its nuclear and non-nuclear offensive capabilities, as well as its missile warning sensors, under one unified command.

"The advantages our forces derive from space are such huge advantages they could possibly be held up as a strategic deterrent much like pointing nukes at people to keep them from acting stupid," said Army Maj. Barry Venable, spokesman for U.S. Space Command.

For example, the president may want to launch a network attack disabling a country's electricity or food distribution system rather than dropping 50 Peacekeepers.

"Now the world relies on threats of nuclear exchange to keep everyone in their sandbox. Space presents non-nuclear strategic options," Venable said. "The idea is to roll all those things under one commander who can present the options to the president."

Rumsfeld did not name a head of the new command - which also could be home to future missile defense - but said a nominee will be named soon. Not all of U.S. Space Command's workers will relocate. About 50 to 300 of the command's 800-plus staffers will transfer to the new headquarters, according to estimates.

Colorado Springs' loss will be offset by the arrival in October of Northern Command, which will be responsible for policing U.S. sea, land and air from attack. Northern Command, which will mean 500 to 1,000 jobs, is going to Peterson, pending an environmental study.

The merger isn't expected to pull Air Force and Army space commands, which together have more than \$8 billion budget, out of Colorado Springs.

The Colorado Springs Chamber of Commerce said Wednesday it expects the contractor base in the Springs to remain strong because Air Force Space Command continues to be the Department of Defense's contracting agent for space.

Washington Post

June 27, 2002

Pg. B1

Arsenic Cleanup Questions Linger

Spring Valley Called 'Safe,' but GAO Report Incomplete

By Steve Vogel, Washington Post Staff Writer

A federal investigation into World War I chemical weapons contamination in Spring Valley could provide no definitive answers on the extent of the cleanup required or the risks facing residents of the Northwest Washington neighborhood, according to a report issued at a congressional hearing yesterday.

The General Accounting Office made no recommendations and left unanswered many questions that members of Congress asked in requesting the report last year. Nor did its investigators reach any conclusion on the potential health risks in Spring Valley, where the Army Corps of Engineers is preparing to remove soil from 160 properties with elevated levels of arsenic.

"Are residents safe?" Rep. Constance A. Morella, (R-Md), who chaired a House subcommittee hearing on the report yesterday, asked a panel of witnesses.

"That's certainly the answer everyone would like, and I don't have an answer," responded David Wood, the GAO official who oversaw the Spring Valley investigation.

The report said uncertainties, including the possible discovery of further buried munitions, could add to the cost and length of cleanup efforts.

Senior officials from the Army and the Environmental Protection Agency gave a brighter assessment yesterday about Spring Valley, built on land the Army used for experimenting with chemical weapons during World War I. While acknowledging that buried munitions "pose a risk," Deputy Assistant Secretary of the Army Raymond Fatz said that "Spring Valley is a safe place to live and raise a family."

Thomas Voltaggio, the deputy regional administrator for the EPA's mid-Atlantic region, emphasized that nearly 90 percent of the homes in Spring Valley do not have elevated arsenic levels, based on testing done over the past year. However, a top official from the D.C. Department of Health was more cautious. "I don't think you can really say it's safe, but from a public health standpoint you can say the risk is low," said Theodore Gordon, senior deputy director for public health assurance.

Among the issues left untouched by the GAO report was an assessment of how federal officials handled the matter when it surfaced 16 years ago. The Washington Post reported last year that the Army and EPA failed to fully investigate evidence the government had in 1986 of possible buried chemical weapons and dangerous ground contamination.

"We still do not know why the Army Corps failed to identify the Spring Valley area as contaminated before 1993," Morella said.

Del. Eleanor Holmes Norton (D-D.C.), the ranking minority member on the House Government Reform subcommittee on the District, added that the GAO report "doesn't tell us who knew what and when."

Wood said the GAO was precluded from reporting on those issues by litigation. The Army is being sued by several residents, as well as American University. The EPA's criminal division has been investigating the matter, but Voltaggio said yesterday that he did not know the status of the investigation.

"It is sad and disturbing that we may never know the whole story," Morella said.

The GAO report does note that the Corps has concluded twice since 1986 that no large burials of ordnance remained in Spring Valley but that subsequent investigations discovered large burial pits and widespread contamination. "The history of the site raises questions about the adequacy of the Corps's process for making cleanup decisions," Woods said.

That issue will be addressed in a separate nationwide investigation, Woods said. The Army has concluded that 4,000 of 9,200 former defense sites it has examined around the country do not need cleanup, and the GAO is assessing those decisions, he said.

Army officials testified that there has been great progress over the last year in Spring Valley, and they estimated that the cleanup will take an additional five years and \$71 million -- for a total cost of \$125 million -- to complete.

The co-chairwoman of a Spring Valley citizen advisory panel called on Congress to ensure that the cleanup is fully funded. "After a decade of dereliction, delay and uncertainty, we have appealed to congressional appropriations committee members to earmark sufficient funds," Sarah Stowell Shapley testified yesterday.

Another citizens representative testified that neighbors are concerned about property values and eager to see the whole issue resolved. William Harrop, president of the Spring Valley-Wesley Heights Citizens Association, expressed skepticism about the health risk posed by arsenic and said the Army and the EPA are being overly cautious.

"The neighborhood's greatest worry is that the entire process of remediation has begun to seem without end," he said.

Inside The Pentagon

June 27, 2002

Pg. 1

Pentagon Eyes Bunker-Busting Conventional Ballistic Missile For Subs

The Pentagon is taking initial steps to develop a conventional submarine-launched ballistic missile that could penetrate hardened underground targets, like command and control bunkers and storage sites found in Iraq and North Korea, according to Defense Department sources and documents.

The new "penetrator" weapon would be based on the Navy's premier Trident D-5 nuclear missile, swapping out the front end so the weapon could destroy a target conventionally only after it has burrowed deep into rock and reinforced concrete, according to defense officials.

Launched from a stealthy submarine, the strategic-range missile's flight time to target would be measured in minutes. That means a fleeting target -- like a suspected terrorist's temporary hideout halfway around the globe -- might be destroyed very quickly after a sub receives the order to shoot.

The new weapon, if produced, could make good on President Bush's desire "to be ready for pre-emptive action when necessary," as he said in a June 1 speech at West Point.

But the effort to develop such a weapon may prove highly controversial. Defense strategists and diplomats worry the launch of a conventional D-5 missile from a submerged sub could easily be misinterpreted by other nuclear powers, like Russia or China, as a launch of its clone, the nuclear D-5.

The nuclear Trident D-5 is perhaps the most fearsome weapon in the U.S. arsenal because of its ability to attack multiple, hardened targets in a knock-out punch. Each of 18 Ohio-class Trident submarines carry 24 D-5 long-range missiles, and each of those is loaded with up to eight re-entry vehicles that can be independently targeted.

In the first minutes when foreign satellites or radars detect a U.S. submarine's missile launch, potential nuclear adversaries may assume the worst: that the missile is nuclear-armed and headed their way. Alarm about the imminent possibility of doomsday may prompt a foreign leader to launch his own nuclear weapon -- or weapons -- before coming under attack, the thinking goes.

Pentagon officials are cognizant of the risks and are weighing the trade-offs seriously, one defense official told Inside the Pentagon last week. Such questions are part of a summer study the Defense Department is conducting as it prepares its fiscal year 2004 budget plan, the official said.

Seed money

However, the Bush administration has already requested funds to lay the groundwork for the conventional sub-launched weapon in the FY-03 budget now under consideration on Capitol Hill. As part of the Defense Emergency Response Fund the federal government crafted for fighting the war on terrorism after Sept. 11, the Pentagon has asked for \$30 million to begin a "three-year effective enhancement" effort to "demonstrate a near-term capability to steer a sea-launched ballistic missile warhead to GPS-like accuracy," according to explanatory budget materials obtained by ITP.

The latter reference is to the Global Positioning System, which allows modern conventional weapons a high level of accuracy that, in some cases, can substitute for a nuclear weapon's massive firepower in effectively destroying a target. The Pentagon budget document says already-developed electronics and instrumentation can be added as an extension to the tail of the D-5's re-entry vehicle, along with new control surfaces for steering.

A Navy official said the technology development would apply to the D-5 re-entry vehicle regardless of payload, and emphasized that the service has not at all committed itself to developing or building a conventional variant of the D-5.

But the Pentagon would not be pursuing such an accuracy improvement to the D-5 at this time absent the end goal of a conventional ballistic missile, said one defense official. "I'm holding the technology investment standards to a measure consistent with conventional payloads," the official told ITP this week.

The D-5 research and development program is to fulfill a requirement for "hardened target munitions" laid out in the Pentagon's recent Nuclear Posture Review, the budget materials state. The review, whose classified contents were excerpted in the news media, stated that in FY-03 the Defense Department would begin "to explore concepts for a new strike system that might arm the converted SSGNs" -- four of the Navy's 18 Ohio-class ballistic-missile-carrying submarines. "Desired capabilities for this new strike weapon include timely arrival on target, precision and the ability to be retargeted rapidly."

The Navy's public plans to date have been to convert these four Trident submarines so they could launch conventional Tomahawk cruise missiles instead of D-5 nuclear ballistic missiles.

But the Tomahawk's range is only about 1,000 miles, just a quarter of the D-5's 4,000-plus mile reach. And although the SSGN conversion has not even begun, voices are already rising to convert the Navy's remaining Ohio-class subs to carry some conventional D-5 ballistic missiles for long-range strike against underground targets, in addition to their nuclear payload.

"The strategic submarine's nuclear-only arsenal . . . limits its ability to deter non-nuclear threats," writes Navy Cmdr. Ken Perry, commanding officer of the Pennsylvania, a D-5-carrying sub not slated to get the Tomahawks. He penned an article in the June issue of the U.S. Naval Institute's Proceedings, advocating the idea of putting conventional D-5s on subs. "We are not going to launch a strategic nuclear missile in response to a tactical terrorist strike, and the terrorists know it," the sub commander writes.

Perry, who was unavailable for interview this week, suggests a conventional D-5 missile fits well into Bush's emerging strategy, which calls for pre-emptive military strikes, in some cases, to prevent attacks against the United States or its allies.

"For the 14 Ohios not planned for conversion, adding conventional warheads to their existing D-5 missiles will help realize their potential as broad-spectrum strategic deterrents and add valuable combat capability in an area of heightened interest," he writes. "If North Korea were to load a Taepo Dong tactical missile on its launcher, for example, a Trident missile with a conventional warhead could be the U.S. action to defend itself and regional allies." But Pentagon officials hope to go even further in developing the new weapon, describing in budget documents a D-5 that would be optimized for penetrating below the earth's surface.

The effort to modify the D-5 would draw off of existing technologies demonstrated over the past two years in a joint Navy-Army effort called "Tactical Missile System - Penetrator," or TACMS-P, defense officials tell ITP. Under that initiative, the services are taking the booster from an Army Tactical Missile System, or ATACMS, and fitting it with a precision re-entry system and a penetrator warhead, according to Pentagon officials, who spoke on condition of anonymity.

The Army-led TACMS-P developmental effort is expected to run through early 2004, culminating in a full system demonstration. At the same time, the Pentagon is requesting \$55 million in FY-03 to extend the TACMS-P's range. It is unclear how long it might take to apply the technology to the much longer-range D-5, but officials are hopeful they could soon see a prototype that could be used, if necessary, in the war on terrorism.

Vexing targets

We are "trying not to reinvent any wheels" in the effort to build a conventional D-5 penetrator, said one Pentagon official last week. Shadowy terrorist networks like al Qaeda lack the obvious targets posed by traditional nation-states, meaning Pentagon officials must "do all that we can do by way of [developing] concepts" for putting these adversaries at risk, the official said.

The Nuclear Posture Review, which the Pentagon submitted to Congress Dec. 31 and partially briefed to the media in early January, describes the existence of hard and deeply buried targets as a particularly vexing military problem. More than 1,400 underground facilities worldwide are believed to house strategic military assets, including weapons of mass destruction, ballistic missiles or command and control for top leaders, according to the classified review. Such underground targets "are generally the most difficult to defeat because of the depth of the facility and the uncertainty of the exact location," states the review. "At present the United States lacks adequate means to deal with these strategic facilities."

Even the nuclear arsenal does not adequately threaten some of these targets, the review states, and nuclear weapons with large yields carry the penalty of damaging nearby structures and spreading radioactive fallout, according to the Nuclear Posture Review.

"In general, current conventional weapons can only 'deny' or 'disrupt' the functioning of [hard and deeply buried targets] and require highly accurate intelligence and precise weapon delivery -- a degree of accuracy and precision frequently missing under actual combat conditions," the document states. "Similarly, current conventional weapons are not effective for the long-term physical destruction of deep, underground facilities."

The posture review reflects the administration's interest in developing more effective conventional weapons that can produce strategic effects. "Non-nuclear strike capabilities may be particularly useful to limit collateral damage and conflict escalation," the review reads.

Conventional weapons may also prove a more credible deterrent to U.S. adversaries, in that they lack the stigma of nuclear weapons and are thus eminently "usable," military experts say.

The right weapon?

Yet, might their very use precipitate a nuclear war? When a Russian or Chinese satellite detects a sudden ballistic missile launch from the middle of the ocean, how could those nations be certain a nuclear missile was not on its way?

"Imagine you're somewhere in the vicinity of where this missile is being aimed, and say you weren't always friends with the United States," said one senior military officer interviewed this week on condition of anonymity. "Wouldn't you have some concern about the payload and destination?"

Even if such an incident does not provoke a nuclear response, it "certainly" has the potential to cause alarm, this source said. "That would be an important consideration in exploring this approach," the officer concluded.

"It's like pulling out a pistol and saying to the person you point it at, 'These are blanks, believe me,'" said one former high-level State Department official, also speaking on background this week. "If it were your parents, they might believe you. But if it were someone you'd had fights with in the past, it might be different."

"We are uncovering all those leaves and rocks" in the Pentagon's summer review, triggered by the recently completed Defense Planning Guidance, responded one defense official. "If it appears there are more problems and risks than benefits, we'll work this all out."

Were the Navy submarines subject to greater visibility or foreign inspection, potential trigger fingers might not be so itchy, experts say. But the Navy has traditionally rejected subjecting its submerged service to greater transparency, saying the submarine's stealthiness is the very means by which the naval ballistic missile fleet remains secure.

For that reason, some defense analysts say land-based ballistic missiles may lend themselves more to conversion over to conventional weapons. Advocates say conventional intercontinental ballistic missiles could be inspected by the Russians or Chinese and remain in fixed sites, such that their launch would not prompt undue anxiety in those nations.

A land-based conventional ballistic missile is one among several solutions the Pentagon is looking at, says Air Force Chief of Staff Gen. John Jumper. "Why do you put the thermobaric bomb in the mouth of a cave when you could send a Mach 40 depleted uranium 'blivet' into it and take the whole mountain away, from high enough altitude?" Jumper said at an event on Capitol Hill last week.

The answer "might be a conventional -- even a non-fuzed, non-explosive -- solution," he said. "If it goes fast enough, at Mach 40 you can hit something with Quaker Puffed Wheat and do a pretty good amount of damage." Jumper may have a point. In August 1995, the Air Force tested a non-nuclear ballistic missile, guided by an inertial measurement unit and fitted with a pointy penetrator front end, against a rocky target. The test range aimpoint was a deep slab of granite, a rock known for its hardness and similar to a very hard reinforced concrete facility, scientists said.

Entering at almost a 90-degree angle, the missile penetrated through 30 feet of the rock. If the missile had been optimized for weight, speed and shape, it could have burrowed much more deeply, service officials said (ITP, May 16, 1996, p5).

Still, this concept offers challenges as well. Experts say ICBMs launched from current bases in the Midwest would drop their first missile stage over America's heartland or Canada -- perhaps an acceptable price to be paid in the context of a nuclear war, but unlikely to gain popular support in conventional weapons launches. As a result, conventional ICBMs might require new basing on U.S. coasts.

Additionally, land-based ballistic missiles lack some of the flexibility of their submarine counterparts. A sub can be maneuvered to allow its missile to attack a target at an optimal angle. In contrast, an ICBM's trajectory may not allow it to threaten all underground targets, particularly those on the opposite side of a mountain face.

Air Force spokeswoman Maj. Angela Billings said this week that since studying the conventional ICBM concept in 1997 and 1998, the service has not included funding in its budget to further develop such a weapon. Still, she said, it remains "one of many potential solutions the Air Force is considering for hard and deeply buried targets."

Fast reaction

The Navy may well prove quicker on its feet in addressing this thorny target set. The Ohio-class missile launchers, argues submarine commander Perry, "can be on station essentially year round, holding potential terrorist and other aggressors at risk around the clock and around the world."

Yet for some, the first idea out on the street may not necessarily be the best one. "We are entering a different world where a new threat is defining a new doctrine," said the former State Department official. "And a new search for missions is defining what we build."

The massive budget increases for defense since Sept. 11 may make the services even hungrier for more bites of the funding pie, the former high-level official suggested. "Do we really need this [particular weapon] in our arsenal?" asked the official, noting this may be an indication the Navy is in search of a new mission for its Trident submarines, now that the Cold War is over and the utility of nuclear weapons is further receding.

With Bush's fledgling strategy against terrorists and the nations that support them, the services may already be jockeying to "get into this pre-emptive approach," the official observed.

Bruce Blair, president of the non-profit Center for Defense Information in Washington, called the desire to convert from the nuclear to the conventional generally a "good sign." Blair, a former Air Force missile launch officer, said he sees a "dominant trend" toward increasingly accurate and small conventional weapons substituting for nuclear missiles, which are now widely viewed as unusable.

But during the transition, serious risks exist, he said. The Russian command and control system remains largely the same as it was at the height of the Cold War, according to Blair.

If any "D-5 missile is fired from a Trident sub in any ocean, it will trigger a Russian response," he said. "Procedures [are] still in place that alert the Russian leadership about an impending nuclear attack and prepare for a possible nuclear response."

Even if a given Trident submarine carried only conventional D-5s, its launch from a patrol area from which nuclear D-5s might be launched could set in motion a disastrous chain of events, he said. "It would grab the attention of the world, wouldn't it?" Blair said.

-- *Elaine M. Grossman*

Baltimore Sun
June 27, 2002

Scientist Theorized Anthrax Mail Attack

FBI searched apartment of expert linked to study

By Scott Shane, Sun Staff

Dr. Steven J. Hatfill, the former Fort Detrick biodefense researcher whose Frederick apartment was searched Tuesday by the FBI, commissioned a 1999 study that described a fictional terrorist attack in which an envelope containing weapons-grade anthrax is opened in an office.

The study, written by a veteran of the old U.S. bioweapons program, was submitted to Hatfill and a colleague at Science Applications International Corp., the McLean, Va., defense contractor where he then worked.

It discusses the danger of anthrax spores spreading through the air and the requirements for decontamination after various kinds of attacks. The author, William C. Patrick III, describes placing 2.5 grams of *Bacillus globigii*, an

anthrax simulant, in a standard business envelope - slightly more than the estimated amount of anthrax in each of the letters that killed five people last fall.

The study, portions of which were read to The Sun by a person who has a copy, illustrates the central paradox of the FBI's nine-month quest for the anthrax mailer: The perpetrator could be a respected American scientist in the biodefense field, where he acquired the skills he then used to kill.

The study discussing the mail attack, for instance, was written as a scientific exercise to draw on Patrick's expertise and help improve defenses against bioterrorism. But the FBI must consider the possibility that such a document could have planted the seed for a terrorist plot.

The traits of a top-notch specialist in biodefense are the same as those of the likely perpetrator of the mail attacks: knowledge of anthrax and how it can be turned into a potent weapon; access to a lab where anthrax is stored; vaccination against anthrax; even very strong views about the threat of bioterrorism.

Hatfill, 48, is a colorful character with all those traits and more. He has said in interviews that his background naturally drew the FBI's attention. Attempts to reach him yesterday were unsuccessful, and the manager of his apartment complex told reporters he was traveling overseas. Hatfill has adamantly denied having anything to do with the anthrax mailings.

A physician and Ph.D. who completed Army Special Forces training, Hatfill is a pilot and has special training in aviation and submarine medicine. He spent 14 months as a doctor and researcher in Antarctica. More recently, he told his college alumni magazine that he has trained with the United Nations to become a bioweapons inspector in Iraq if the regime agrees.

Hatfill, raised in Mattoon, Ill., attended medical school in Zimbabwe, then Rhodesia, and has described witnessing in 1979-1980 the largest outbreak of human anthrax - an estimated 10,000 cases, most of them cutaneous. Experts still debate whether the Zimbabwe outbreak occurred naturally or was a tactic in the civil war then raging between the white government and black guerrillas.

In recent years, while working at the U.S. Army Medical Research Institute of Infectious Diseases at Fort Detrick as well as at the National Institutes of Health, Hatfill has spoken frequently on the bioterrorist threat, stressing how easy it would be for a terrorist to brew a deadly bioagent in his kitchen. While at SAIC, where he worked from 1999 until March, he helped create a mock bioterror laboratory for use in a training exercise in Guam for soldiers of the U.S. Special Operations Command.

Hatfill is a friend and protege of Patrick, 75, a bioweapons legend who has himself experienced the dual status of expert and possible suspect.

Recently, Patrick underwent a three-hour FBI polygraph examination. When he passed, the FBI invited him to join the inner circle of technical advisers to the investigation, Patrick said.

Another anthrax expert, Martin Hugh-Jones of Louisiana State University, said he, too, has been questioned repeatedly by the FBI, both as a scientist and as a possible perpetrator.

"Sometimes it's one and sometimes it's the other," he said. He doesn't like being grilled, but he accepts it. "I think they would have been derelict if they hadn't questioned me."

In the case of Hatfill, it is unclear why FBI agents waited at least six months after they first questioned him to conduct a thorough search of his home. One possibility: a briefing last week for Senate staffers by biologist Barbara Hatch Rosenberg.

Rosenberg, who heads a biological weapons working group at the Federation of American Scientists, has repeatedly criticized the bureau for failing to aggressively pursue a "likely suspect" whom she has not named but who closely resembles Hatfill. Her Senate briefing was attended by Van Harp, who heads the anthrax investigation as assistant FBI director in charge of the Washington field office, and three other FBI agents.

FBI officials, speaking on background, say that Hatfill is only one of many scientists who have come under scrutiny, that he agreed to the search and that they found nothing incriminating, though tests for anthrax spores are not complete.

Yet neighbors and television viewers will not soon forget the daylong spectacle of FBI agents, some in protective gear, carrying equipment in and out of Hatfill's apartment just outside the gates to Fort Detrick.

In March, in a telephone message to The Sun, Hatfill complained that his very dedication to the cause of biological defense had brought him under suspicion. He said he had just been fired from his job at SAIC, the defense contractor, and blamed news media inquiries.

"I've been in this field for a number of years, working until 3 o'clock in the morning, trying to counter this type of weapon of mass destruction, and, sir, my career is over at this time," Hatfill said. "There was a lot of hysteria. A lot of us got polygraphed over this incident as part of the screening process."

However, SAIC officials said Hatfill was dismissed because his security clearance had been suspended by the Defense Department on Aug. 23, 2001, and had not been restored more than six months later. Company officials

said they were not told the reason for the suspension. Press inquiries about Hatfill had nothing to do with his firing, they said.

A few other details of the FBI's scrutiny of Hatfill emerged yesterday. Investigators have learned that while in Rhodesia, Hatfill lived a few miles from a Greendale School, according to a report on ABC News, confirmed yesterday by a Rhodesian medical school classmate. The return address on some of the anthrax letters was "Greendale School" with a fictitious address in New Jersey.

The Associated Press reported that agents have searched a public storage facility Hatfill rented in Ocala, Fla. Hatfill's parents, Norman and Shirley Hatfill, own a thoroughbred farm in Ocala called Mekamy Oaks that he has occasionally listed as his address.

The current FBI and media scrutiny of Hatfill is only a more intense version of the attention that has bedeviled the Army's premier biological defense centers at Fort Detrick and Dugway Proving Ground in Utah. Scientists who have devoted their careers to protecting the country from a bioterrorist enemy have been angered and frustrated to suddenly be seen as possible enemies themselves.

"Everybody's under suspicion," said Gigi Kwik, a fellow at the John Hopkins Center for Civilian Biodefense Strategies who did post-doctoral research at Fort Detrick last year and has kept in touch with colleagues there. "It's a terrible atmosphere."

Work habits that ordinarily win bosses' praise have become suspect, as FBI agents check lab access records and ask which scientists worked late at night. "I routinely was there until midnight," Kwik says. "That was expected of me as a post-doc."

David R. Franz, commander of USAMRIID at Fort Detrick from 1995 to 1998, said he fears the suspicion that has focused on the biodefense research center may do it serious harm.

He noted that USAMRIID scientists worked long hours to test suspected anthrax powder last fall and have provided extensive technical assistance to the FBI. Yet dozens of the same workers are now being given polygraph tests, and the institute is repeatedly named in the news media as a possible source of the mailed anthrax.

"To see them dragged through the mud is what hurts me," Franz said.

Nonetheless, he says, it is critical that the FBI solve the case.

"It's so important for this nation that we find this person or persons and show that you don't do this to us," he said.

"If we don't catch them, we'll be inviting others to try it again."

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Pg. B3

Anthrax-Related Search Unproductive

The FBI found nothing to link a biologist to the deadly anthrax letters after thoroughly searching his apartment in the Fort Detrick area, law enforcement sources said yesterday.

FBI agents on Tuesday searched the apartment of Steven J. Hatfill, 48, who worked in the Army's biodefense laboratory at Fort Detrick from 1997 to 1999. He consented to the search, which took several hours and included examinations of air vents, law enforcement sources said.

Hatfill was not a suspect in the investigation, but was one of several people who had access to the "correct strain" of anthrax, one law enforcement source said. Hatfill had previously been interviewed by the FBI, sources said.

Several other apartments have been searched during the investigation, law enforcement sources said.

A person close to Hatfill said yesterday the scientist was angry at the media, not the FBI, for focusing on him. Five people were killed by the anthrax letters that were sent shortly after Sept. 11.

Gas Masks Ordered to Protect Capitol

By Leslie Miller

Associated Press Writer

Wednesday, June 26, 2002; 1:50 AM

WASHINGTON — Call it another sign of the times: 25,000 gas masks have been ordered to help protect the Capitol — tourists included — in the event of a chemical or biological attack.

Capitol Police officials were to announce they had ordered up the so-called quick masks on Wednesday, a congressional official said, speaking on condition of anonymity.

They'll be stored around the building to help tourists, members of Congress and their staffs survive a chemical or biological attack, the official said.

"The reason we're doing it is because the Capitol was targeted for a bioterrorist attack, the anthrax attack," the official said.

Anthrax-laced mail sent to the Capitol last fall killed two postal workers.

Lawmakers in the past had some protection from bioterrorists, the official said, as gas masks have been a security feature on the House floor for years.

"They (the police) were basically just trying to include tourists," the official said. "They're not going to have only 535 masks."

Before the terrorist attacks, about 10,000 visitors walked the Capitol's halls on a busy day. Some took guided tours, but many roamed freely.

Then came Sept. 11 and anthrax, which frightened away many of the city's visitors.

Returning tourists are finding the Capitol a much more security-minded place.

No more self-guided tours of the building, for example. About 1,000 people take the public tour; others take private tours arranged by congressional offices or see only the House and Senate chambers.

Outside, cement barriers and metal posts now ring the sprawling Capitol grounds. Another 700 officers have been added to the Capitol Police force. Security is tight around a construction zone on the east side where a \$368 million, three-story visitors center is being built underground.

And now, 25,000 quick masks.

Though the Fourth of July has filled some with foreboding of another attack — police will be on heightened alert for the holiday — the masks aren't a response to any specific threat, the official said.

"It's part of an ongoing process," the official said.

Quick masks aren't quite gas masks, but hoods that filter chemical gases and biological particles through a fitted mouthpiece. They're used by paramedics, firefighters and police officers who first respond to emergencies.

Quick masks sell for \$150 each on a Web site hosted by Kennesaw, Ga.-based Brigade Quartermasters.

Telephone calls to the Capitol Police seeking comment were not returned Tuesday night.

<http://www.washingtonpost.com/wp-dyn/articles/A45928-2002Jun26.html>

Source: Clemson University (<http://www.clemson.edu/>)

Date: Posted 6/26/2002

Clemson Researchers Create Biosensors To Protect Nation's Food And Water Supplies

CLEMSON — Unlike nuclear terrorism, bioterrorism won't begin with a bang. It will begin with a whimper — a child feeling the effects of food poisoning. E.coli, Listeria, Campylobacter, Salmonella are not weapons of mass destruction, they are weapons of mass disruption. Experts say it's not a matter of if but when terrorists will attempt a strike at our food or water supply. If they succeed, hundreds, perhaps thousands, of Americans will become sick, and some among the youngest and oldest victims could die.

An early warning detection system is urgently needed. At Clemson University, researchers are developing a biosensor that will make contaminated food glow in the dark.

A team of chemists, microbiologists and food scientists have devised a way to tether luminescent molecules to food pathogens, such as E.coli, and Salmonella. Using nanotechnology, the researchers are building a new screening method to protect our food supply.

"What's needed is a simple, low cost way to rapidly detect pathogens at the site of contamination, not having to wait for lab results," said food science professor and team leader Paul Dawson. "What we have worked on are particles that are luminescent, providing a way to flash an alarm to hold the food for closer examination."

Chemists used a similar technique to identify worms in pecans. The worms would absorb a chemical that would glow under UV or "black" light. Dawson, along with professors Ya-Ping Sun, Xiuping Jiang, Feng Chen and James C. Acton, have miniaturized the process by applying nanotechnology, the science of building structures at molecular and atomic levels. It is not just the science of the very small, it is a technology, enabling the practical application of that knowledge by scientists who investigate arranging atoms to create innovations that can be seen only with electron microscopes.

Nature does a great job of putting together molecules and other nanoscale components in complex patterns, Dawson said. His team is working on a single molecule process, creating a "protein key" that would "key and lock" with another molecule and creating a bio-alarm, when key and lock fit. Most pathogens and toxins have a unique "lock," and by attaching the matching "key" on the surface of a luminescing nanoparticle, a nanosensor can be created. The sensor signal can be rapidly detected and be a first line of defense in identifying food or water that has been contaminated.

"The nanoparticle can move into crevices in the food source, where a pathogen could be hidden from microscopic view," Dawson said. "The particle's extremely small size increases the odds that the antibody and antigen will link, enabling the sensor to give off a glow. The more connections, the greater the glow."

Derived from the Greek word for midget, "nano" means a billionth part. A nanometer (abbreviated nm), for example, is one billionth of a meter. An atom measures about one-third of a nanometer. The diameter of a human hair is about 200,000 nm.

<http://www.sciencedaily.com/releases/2002/06/020625062836.htm>