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REDUCING THE THREAT OF CHEMICAL AND BIOLOGICAL WEAPONS

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BEFORE THE

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REDUCING THE THREAT OF CHEMICAL AND BIOLOGICAL WEAPONS

Tuesday, March 19, 2002

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C.

The committee met, pursuant to notice, at 10:12 a.m. in Room SD–419, Dirksen Senate Office Building, Hon. Joseph R. Biden, Jr., chairman of the committee, presiding.

Present: Senators Biden, Feingold, Helms, Lugar, and Frist.

The CHAIRMAN. The hearing will come to order. Carl, welcome back to the committee. It's been a long, not a long time since you were here, but I remember the good old days when you were being of considerable assistance to our colleague John Glenn and it's nice to have you back.

Today the Committee on Foreign Relations continues a hearing in a series that began in early February, which we entitled Securing America's Future. The key purposes of these hearings are to engage in as sober a discussion as we can to determine what the most urgent threats facing the United States are and to determine how our nation should prioritize the resources, although considerable, nonetheless limited, to address the most eminent threats.

Two weeks ago the committee heard from a group of America's top scientists on the potential dangers associated with so-called dirty bombs and improvised nuclear devices. Today we look at a threat posed by chemical and biological weapons or CBW as it's referred to, especially in the hands of terrorists.

Last fall's anthrax attacks demonstrated that even a small scale CBW attack can greatly disrupt our lives. Those attacks resulted in 23 anthrax cases and five deaths, but the impact on this country, the impact on this city, the impact on this body far exceeded that number. The next time a CBW attack occurs the consequences could even be graver.

In the extreme case, the Department of Defense estimates that on the unlikely prospect that a small pox attack would occur that could cause as many as 4 million deaths. The intelligence community has warned that al Qaeda was working to acquire dangerous chemical agents and toxins as well as biological weapons. We do not know if al Qaeda succeeded in these efforts, but we do know that they showed their trainees how cyanide works.

And earlier this month, a self-styled anarchist was found to be storing cyanide precursors in a Chicago subway tunnel, which I would note parenthetically, I'm going to urge my colleagues as early as today to take up the Amtrak legislation for threat reduc-

tion relating to modernizing the tunnels that Amtrak has. There are five tunnels under New York City to carry 350,000 people a day are in those tunnels. There's no ventilation, there's no lighting and there is no means of escape. And the same with the Baltimore tunnel.

But some threats like third world ICBMs or space warfare are years from becoming imminent notwithstanding their threats, but the threat of chemical and biological weapons is here today and in my view we have to deal with it today.

As our first witness will shortly explain, a number of nations are actively pursuing chemical and biological weapons programs. The members of President Bush's axis of evil are on this list and so are other nations. There's no single easy way to roll back the proliferation of chemical and biological weapons, but we must persist on a number of fronts. Engaging in tough-nosed diplomacy, enforcing strong export controls agreed upon with our allies and revitalizing the two applicable arms control regimes, the Chemical Weapons Convention and the Biological Weapons Convention, and applying sanctions where appropriate and turning to our military force where necessary.

Nations can be deterred from using chemical or biological weapons. In 1991, the first President Bush told Saddam Hussein if Iraq dared to employ chemical weapons against U.S. troops, the United States would leave no option off the table, implicitly including nuclear weapons. Saddam chose to live another day and did not use chemical weapons.

Unfortunately, deterrents may not work so well for terrorists. Especially groups like al Qaeda which aim to kill as many innocent victims as possible, even at the cost of their own lives. Vice Admiral Thomas Wilson, Director of the Defense Intelligence Agency warns that such weapons may be "attractive to terrorist groups intent on causing panic and inflicting larger numbers of casualties. The psychological impact of the recent anthrax cases in the United States did not go unnoticed."

How can the United States best contain and reduce this threat? One answer lies in the arms control agreements we all ready have at our disposal including the Chemical Weapons and Biological Weapons Conventions. The CWC allows for both routine and challenge inspections to detect and deter clandestine activities. Moreover, state parties are required to enact legislation with punitive sanctions to make CWC prohibitions binding on their nationals living both at home and abroad.

Unfortunately, the CWC has not achieved its full potential. The Organization for the Prohibition of Chemical Weapons, the implementing organization for CWC, has struggled with both mismanagement and financial crises over member assessments and reimbursements for inspections costs. The Organization has been forced to reduce its verification activities and cut back on industry inspections.

During five years the Convention has been in effect, no party has requested a challenge inspection. I'm glad to hear the Administration is closely looking at the Organization to resolve its funding and management challenges, but we need an effective chemical weapons regime.

We must also re-emphasize the Biological Weapons Convention. It is not my intention here today to rehash the debate over whether the United States should have agreed to the draft compliance protocol to the Biological Weapons Convention last year. I personally do believe the Administration was needlessly confrontational, but I understand its concerns over the protocol as drafted.

Today I want to look ahead to the reconvening of the Biological Weapons Review Conference this November and ask how the United States can best enhance the implementation of this Convention? One option lies in strengthening global disease surveillance to help detect and contain infectious outbreaks, whether they are a result of biological weapons or natural disease.

The Administration has proposed that BWC state parties commit to strengthening the World Health Organization's global alert and response network. However, many developing nations lack the resources and the infrastructure to effectively plug into and contribute to the WHO network.

For that reason, Senator Helms and I at the appropriate time plan to introduce the Global Pathogen Surveillance Act of 2002. This bill would provide up to $150 million over the next two years for necessary resources, both expertise and technical equipment to monitor infectious disease outbreaks within their borders, and cooperate with international investigations. I look forward to working closely with the Administration as we move forward on this issue.

Another means of reducing the threat of chemical and biological weapons is to shut off access to those weapons and their infrastructure. I've often said that Russia is a virtual bonanza of weapons grade nuclear material that terrorists might attempt to steal. Well, guess what folks? Russia can be just as inviting a target for terrorists seeking chemical and biological weapons.

Russia possesses the world's largest chemical weapons stockpile estimated at approximately 40,000 metric tons. Eighty percent of this stockpile consists of nerve agents. Only a few single drops of which can kill on contact. Russia acceded to the Chemical Weapons Convention in 1997, but bureaucratic disputes and lack of funding delayed the start of destruction activities until last year. Russia was supposed to meet by the year 2007, the chemical weapons deadline for the destruction of its entire stockpile. It remains doubtful if Russia can even meet the extended 2012 deadline.

In the meantime, the security of many of these sites where the chemical and biological weapons are stored is poor and represents a real proliferation concern. But at least we have handle on the size of Russia's CW stockpile. During the Cold War, the Soviet Union also conducted a massive covert biological program. Roughly 50 former biological weapons institutes, mostly in Russia, are still open today possibly containing live biological agents. Truth is we don't know.

The Russian Ministry of Defense has refused U.S. requests for access to four former military biological institutes. And as many as 15,000 underpaid, underemployed scientists who worked in the former Soviet programs are now potential targets for recruitment by rogue states and terrorists.

Over the past decade, the United States has carried out a number of programs to help reduce the threat of biological and chemical

weapons proliferation in Russia and the former Soviet Union. In particular, I want to salute the International Science and Technology Centers and a more recent program, the Bio-redirection Initiative for providing peaceful civilian research opportunities to former Soviet scientists who otherwise might be tempted to sell their wares to the highest bidder.

In it's review of nonproliferation assistance at the end of last year, this Administration recognized the value of these programs, nudged I might add by the distinguished Senator from Indiana and pledged continued funding. But September 11th should've shown us that we can't afford to settle for business as usual when it comes to nonproliferation assistance.

It is time for some creative thinking on the part of both the executive branch and the Congress on how to help Russian secure, consolidate and eliminate its chemical and biological weapons stockpiles and infrastructure. Let me offer a couple suggestions and I will invite our witnesses in the second panel to comment on them.

We made a good start last year by authorizing the Department of Defense to spend as much as $50 million in FY 2002 to assist Russia with its chemical weapons destruction efforts. Russia needs to step up to the plate with its own funding and we need to push our European allies to do more, because it's clearly in their interest as much as ours.

But the Russian CW stockpile is a ticking time bomb. We need to accelerate in my view U.S. funding and that may cost as much as $10 billion over several years. A price we can afford if we want to neutralize that menacing threat. One option for financing this is the debt for nonproliferation swaps that Senator Lugar and I have proposed and the Senate passed in its Security Assistance bill would include such authorization.

I strongly encourage the Administration to use that option. We could also turn Russia's biological and chemical weapons scientists into public health corps to clean up dangerous former test sites, develop and produce new vaccines and defeat multi-drug resistant tuberculosis and other diseases. Russian chemists and microbiologists are world class and their work in existing U.S. programs hold great promise. But Russia's environment and public health needs are truly urgent and overwhelming and a massive effort to meet those needs could easily employ up to a thousand more specialists.

Let me now introduce our witnesses at today's hearing. Our first witness will be The Honorable Carl W. Ford, Assistant Secretary of State for Intelligence Research and as I said my colleagues remember a former staff member here and advisor to Senator John Glenn.

Mr. Ford will present to the committee a threat assessment regarding the likelihood of possible chemical or biological weapons attacks against the United States both here at home and in our diplomatic facilities and military posts overseas, but obviously this is an open hearing and Mr. Ford will not discuss some topics and may in fact decline to answer some questions which I leave fully to his discretion.

If you're in doubt, we'll go in closed session or arrange for a closed session meeting later. But I want to thank Mr. Ford for

agreeing on such short notice to appear before this committee and I look forward to his testimony.

Our second panel will feature three renowned experts on chemical and biological weapons who can expand on Mr. Ford's threat assessment and help us figure out what we need to do. Michael Moodie, I hope I'm pronouncing that correctly, President of the Chemical and Biological Arms Control Institute, helped negotiate the Chemicals Weapons Convention when he was Assistant Director of Arms Control and Disarmament under the first Bush Administration.

He is equally proficient in the Biological Weapons Convention and I welcome his advice on how we can better utilize these two arms control regimes if he thinks we can. And Dr. Amy Sands is Deputy Director of the Center for Nonproliferation Studies at the Monterey Institute in California. And if I had to be a director of anything anywhere, I'd like to do it at Monterey. What a magnificent place to do it. I've had the pleasure of speaking there several times.

Dr. Sands who was Assistant Director of ACDA under the Clinton Administration, will discuss how we can minimize the likelihood that terrorists will gain access to and employ chemical and biological weapons.

And finally, Dr. Alan P. Zelicoff, Senior Scientist at the Sandia National Laboratory in New Mexico. He can update the committee on how the United States might best protect against and respond to a chemical or biological weapons attack. With that I will now turn to Senator Helms and then we'll move to the witness. Thank you, Senator.

Senator HELMS. Thank you, Mr. Chairman. You have certainly given a wake up call to the people who are not bothered by the threats by chemical and biological weapons in the hands of rogue states and terrorist groups. I commend you on your statement and I think it ought to be inserted into the record and I'll be glad to do that if you want me to.

The anthrax attacks this past fall have underscored the peril of all of these threats highlighting the need to deal with them in a more direct and determined manner. It's clearly preferable to deter and prevent and defend against a threat in the first place rather than deal with the chaos and death and destruction after the fact.

We can deter the development and use of these weapons by making it crystal clear that to use them against the United States will expose the attacker to the full retaliatory response of our military including the potential use of our most destructive strategic weapons. I hope that never happens. I think we all do.

The President is making this a very clear policy of the United States and I commend him for that. Should the deterrence fail, however, the likelihood of a chemical or biological weapons attack can be minimized through strong export controls and nonproliferation regimes that ensure that terrorist groups and rogue states will not acquire the technology in the first place, along with the expertise to build and deliver these heinous weapons.

Now, our own government meanwhile must do a better job of controlling sensitive dual use weaponry. The United States also must pursue initiatives in the states of the former Soviet Union,

we all know that, in order to secure dangerous materials and to keep scientists gainfully employed so that neither can or will be used by rogue states or anybody else to build weapons of mass destruction.

And we must cause the Russians and the Chinese to halt their transfers of sensitive items and material that are flowing to many of these countries. Mr. Chairman, now you have indicated in your statement, it's critical that we never lose sight of the fact that the United States can prevent a nuclear, biological or chemical holocaust by building a robust missile defense system capable of defending if not deterring such an attack.

I don't know whether you mentioned it earlier in your statement or not, but a recent national intelligence estimate indicated that Iran, Iraq and North Korea, if you will the axis of evil, are building long range missiles and that they have active weapons of mass destruction programs on our hands that will soon pose a direct threat to us.

It therefore makes sense I think to spend some of our defense resources to develop a missile defense system. In any event, we must not surrender to the notion that some of these threats are more likely than others and that they therefore require the greatest share of resources. When it comes to America's security, I think we must be prepared to deal with all threats and to address them with every bit of the strength and purpose that we possess.

And I join you, sir, in welcoming our witnesses for being here and as a matter of fact I thank them for doing it because I know it's an impingement on their time, but thank you for coming all of you.

The CHAIRMAN. Thank you, Senator. Mr. Ford, before you begin, let me apologize to Michael Moodie for mispronouncing his name. Michael, you can call me Biden when you get up here if it makes you feel any better. Be fair. Carl, the floor's yours.

STATEMENT OF HON. CARL W. FORD, JR., ASSISTANT SECRETARY OF STATE FOR INTELLIGENCE AND RESEARCH

Mr. FORD. Mr. Chairman, Senator Helms, Senator Lugar, as a former member of the committee staff, I've always been delighted to come back and share my thoughts and information before the committee. It's always been a delight. I have been troubled that this might be the first exception where it wasn't all that delightful.

I clearly agree with the committee's emphasizing this very important threat of chemical and biological weapons, but I'm really not sure I'm up to the challenge of presenting that threat adequately and coherently and particularly at an unclassified level.

One, I can't think of an intelligence problem more difficult at any level than dealing with biological weapons and chemical weapons. It is a serious concern of the entire intelligence community. A lot of resources are applied to the problem, it is a hard one.

The second issue has to do with even when I can give you some of my personal judgments and beliefs based on having seen that information, the sources and methods used to get most of our findings are so sensitive that the evidence I'll present is sketchy at best and that for the most part, you'll have to take on faith that I'm reflecting a deeper study of the information. I urge you to ask us for

later, either as individuals or as a group to have a more detailed intelligence presentation from CIA, DIA as well as INR to give you a full appreciation for how dangerous we think this is.

What I'd like to do if you'll indulge me is I'll make a few more informal comments and sort of set the scene and then very briefly summarize the major portions of my written presentation and ask if you would to take the full testimony and put it in the record.

The CHAIRMAN. It will be.

Mr. FORD. The issue itself is very complicated. I think that some preparatory remarks are in order so that at least you understand my biases and my conceptual framework so that when I make these statements, you'll at least know where I'm coming from.

I arbitrarily divide chemical and biological weapons into basically three types, having a lot to do with their delivery. The first group and in fact the one that we have the most information on, the one that is in the greatest numbers around the world: battlefield weapons. Weapons that have been produced by a number of countries since World War I that are designed to be delivered by military aircraft, artillery, or missiles. These normally are designed for specific battlefield targets, to disrupt the battle area, protect a particular zone, or provide the opportunity for forces to maneuver.

Even so our own commanders who have looked at the problems of Russian tactics and our own and thought about warfare and the age of nuclear, chemical and biological weapons, believe that they're uncontrollable. And while you may hope to disrupt the maneuver of your enemy, you may also kill a lot of your own people and have your own maneuver limited. So even the battlefield weapons were, at least in our system, always more for deterrence. Hopefully we would never have to use these weapons. If we did, it was always seen as a last resort sort of situation.

They also, because of their military nature, may be easy to steal, but I would say even that is very difficult. They are hard to deliver by any other than a military organization so that while there are a lot of these weapons around, that's probably not the best chance for a terrorist to get a hold of chemical and biological weapons. They're closely guarded even in the most lax systems and even if you got one, what to do with it is a real problem.

A second category are what I call terrorist weapons. The anthrax in the letters would be an example, a very concrete example here in the United States of a terrorist weapon. It didn't kill a lot of people, but it sure psychologically had a huge impact and scared a lot of people and made us recognize and realize the dangers of chemical and biological weapons.

Another example of a terrorist weapon would be a nuclear isotope or nuclear waste sort of bomb that killed a few people through immediate contact, maybe the radiation would affect a few people, but we're talking about dozens rather than thousands. While clearly something that we worry about, it's more in the nature of the psychological damage and the impact that it might have.

The third category is weapons of mass destruction. And at least I personally feel that these are the ones that while most unlikely to be used are the ones that are the scariest and that we have to be certain that we understand and are carefully protecting ourselves against. Here I mean the notion of being able to attack our

livestock or our agricultural areas or poison the water of an entire city where we're talking about tens of thousands of casualties from chemical or biological weapons.

Those are the ones that terrify us the most. Clearly they are ones that we think of when we think of terrorists, but I would argue that terrorists alone based on what we know from al Qaeda and various other groups, almost certainly would have to have state assistance in order to have those sorts of weapons of mass destruction. So you're really talking about the convergence of the people on our bad list and terrorists coming together when you get to the point of weapons of mass destruction.

So with those introductory comments, let me just go through quickly some of the countries that we are most concerned about on these various types of chemical and biological weapons, battlefield, terrorist and weapons of mass destruction.

The first one on my list and I think on most people's list is Iraq. Given Iraq's past behavior, it's likely that Baghdad has reconstituted programs prohibited under UN Security Council resolutions. Since the suspension of UN inspection in December of 1998, Baghdad has had more than enough time to reinitiate it's CW programs. Programs that have demonstrated the ability to produce deadly CW before they were disrupted by Operation Desert Storm, Desert Fox and United Nations inspections.

Iraq's failure to submit an accurate full, final and complete disclosure in either 1995 or 1997 coupled with its extensive concealment efforts, suggest that the BW program also has continued. Without inspection and monitoring of programs, however, it's difficult to determine their current status.

One of the reasons, of course, that Iraq bothers us in particular is that it is one of the countries that's actually used weapons against other forces and against its own people. So that not only do Iraqis have a capability and an intention, they've also done it and that's a small group of countries in that category.

The second one on my list is Iran. Iran, a state party to the Chemical Weapons Convention, already has manufactured and stockpiled chemical weapons including blister, blood, choking and probably nerve agents and the bombs and artillery shells to deliver them. Tehran continues to seek production and technology, training, expertise, equipment and chemicals from entities in Russia and China that could be used to help Iran reach its goal in indigenous nerve agent production capability.

Tehran continued to seek considerable dual use bio-technical materials, equipment and expertise from abroad primarily from entities in Russia and Western Europe ostensibly for civilian uses. We believe that this equipment and know-how could be applied to Iran's biological warfare program. Iran probably began its offensive BW program during the Iran-Iraq War and likely has evolved beyond agent research and development to the capability to produce small quantities of agent. Iran may have some limited capability to weaponize BW.

North Korea has a longstanding chemical weapons program. North Korea's domestic chemical industry can produce bulk quantities of nerve, blister, choking and blood agents. We believe it has a sizable stockpile of agents and weapons. These weapons could be

on a variety of delivery vehicles including ballistic missiles, aircraft, artillery projectiles and unconventional weapons.

North Korea has not acceded to the Chemical Weapons Convention, nor is it expected to do so any time soon. While North Korea has acceded to the Biological Weapons Convention, it nonetheless has pursued biological warfare capabilities over the last four decades. North Korea likely has a basic bio-technical infrastructure that could support the production of infectious biological agents. It's believed to possess a munitions production infrastructure that would allow it to weaponize agents and may have biological weapons available for military use.

Lybia continues its efforts to obtain technologies and expertise from foreign sources. Outside assistance is critical to its chemical and biological weapons program and the suspension of UN sanctions in 1999 has allowed Tripoli to expand its procurement effort with old primarily Western European contacts with expertise, parts and precursor chemicals for sale.

Syria has also vigorously pursued the development of chemical and to a lesser extent biological weapons to counter Israel's superior conventional forces and nuclear weapons. Syria believes that its chemical and missile forces deter Israeli attacks. Syria has a longstanding chemical weapons program and is pursuing biological weapons. Syria depends on foreign sources for key elements of its chemical and biological warfare program, including precursor chemicals and key production equipment.

The U.S. has pressed possible supplier states to Syria to stop such trade, thereby making acquisition of such materials more difficult. The 33 nation Australia Group coordinates adoption of stricter export controls in many countries. As I'm sure you appreciate, the real complexity here is that many, if not most, of the precursors and ingredients in chemical and biological weapons can be used in totally non-dangerous and medical and chemical sorts of experiments, so that it's very difficult other than from intelligence sources to know what the intention of the purchaser of this material is.

The United States believes that Cuba has at least a limited developmental offensive biological warfare research and development effort. Cuba has provided dual use bio-technology to rogue states. We're concerned that such technology could support BW programs in those states.

We call on Cuba to cease all BW applicable cooperation with rogue states and to fully comply with all its obligations under the Biological Weapons Convention. At least at this point, we don't see Cuba involved in chemical weapons research and development.

Serious concerns remain about the status of Russian chemical and biological warfare programs. Chairman Biden went over those very accurately in his opening statement. Moscow has declared the world's largest stockpile of chemical agents—39,969 metric tons of chemical agent to be exact, mostly weaponized, including artillery, aerial bombs, rockets and missile warheads.

According to the Russian CWC declaration, all former Soviet chemical weapons are stored at seven locations in Russia. In the late '80s and early 1990s, it carried out an extensive consolidation

process of chemical warfare material from sites within Russia and from non-Russian locations.

Russian officials do not deny research has continued, but assert that it aims to develop defenses against chemical weapons, a purpose that is not banned by the CWC. Many of the components for new binary agents development by the former Soviet Union are not on the CWC schedule of chemicals and have legitimate civilian applications, clouding their association with chemical weapons use. However, under the CWC all chemical weapons are banned whether or not they are on CWC schedules.

The former Soviet offensive biological program was the world's largest and it consisted of both military facilities and non-military research and development institutes. This program employed thousands of scientists, engineers and technicians throughout the former Soviet Union with some biological warfare agents developed and weaponized as early as the 1950s.

The Russian government has committed to ending the former Soviet BW program. It has closed or abandoned plants outside the Russian Federation and these facilities have been engaged through cooperative threat reduction programs. Nevertheless we remain concerned that Russia's offensive biological warfare capabilities remain.

The United States remains concerned by the threat of proliferation both of biological warfare expertise and related hardware from Russia. Russian scientists, many of whom either are unemployed or unpaid for an extended period, may be vulnerable to recruitment by states trying to establish biological warfare programs. The availability of worldwide information exchange via the Internet facilitates this process.

I believe that the Chinese have an advanced chemical warfare program including research and development production and weaponization capabilities. Chinese military forces have a good understanding of chemical warfare doctrine, having studied the tactics and doctrine of the former Soviet Union. Chinese military forces conduct defensive chemical warfare training and are prepared to operate in contaminated environments.

I also believe that China's current inventory of chemical agents includes the full range of traditional agents and China is researching more advanced agents. It has a wide variety of delivery systems for these, including tube artillery, rockets, mortars, landmines, aerial bombs, sprayers and SRBMs. China acceded to the Biological and Toxin Weapons Convention in 1984, though many believe its declaration under the BWC confidence building measures were inaccurate and incomplete.

China has consistently claimed that it has never researched, manufactured, produced or possessed biological weapons and that it would never do so. However, China possesses an advanced biotechnology infrastructure and the bio-containment facilities necessary to perform research and development on lethal pathogens. It's possible that China has maintained the offensive biological warfare program it's believed to have had before acceding to the BWC.

Finally, terrorist interest in chemical and biological weapons has been growing and probably will increase in the near term. The

threat is real and proven. The ease of acquisition or production of some of these weapons and the scale and terror that they can cause will likely fuel interest in using them to terrorize.

The transport and dispersal techniques also are manageable and can be made effective easily as seen recently in using the mail as a delivery system to spread anthrax. Many of the technologies associated with the development of chemical and biological agents have legitimate civil applications.

In addition, the proliferation of such weapons raises the possibility that some states or rogue entities within these states could provide chemical or biological weapons to terrorists. It remains unlikely that a state sponsor would provide such a weapon to a terrorist group. But an extremist group with no ties to a particular state, but which likely does have friends in state institutions, could acquire or steal such a weapon and attempt to use it.

We have not completed our study of al Qaeda in Afghanistan and their chemical and biological capabilities. So that it's too soon to give you a complete picture, but at least so far, I think that I would summarize it as that our basic judgment remains the same: That they had an almost insatiable appetite for information on biological and chemical weapons, both how to do it and how to deliver it.

They also were interested in talking to a wide range of experts from neighboring countries or co-religionists. We find no evidence so far that they had successfully developed weaponized chemical or biological agents, but I have to admit that at least so far, we feel as we did after we got into Iraq and found out after Desert Storm how much we had missed. I think that many of us are having the same reaction in Afghanistan, that while they didn't succeed, their interests and activities were higher than many of us had imagined until we saw the evidence and we still are looking. Many of the documents and areas have not been fully examined. So I'll have to only give you a partial judgment.

At this point, Mr. Chairman, I will ask that you put the complete testimony in the record and be happy to take any question that you or other members of the committee may have.

[The prepared statement of Mr. Ford follows:]

PREPARED STATEMENT OF CARL W. FORD, JR., ASSISTANT SECRETARY OF STATE FOR INTELLIGENCE AND RESEARCH

Chairman Biden, Senator Helms, I am particularly pleased to come before you today, as I spent many years working for the Senate Committee on Foreign Relations. I enjoyed those years, and am pleased now to contribute to your work again, if in a different way.

More states have credible chemical and biological warfare (CBW) capabilities than ever before. Advanced CBW capabilities and the widespread public understanding of U.S. vulnerabilities since the anthrax attacks which followed on the events of September 2001 makes their use all the more likely. CBW threats challenge not only our homeland and Americans overseas, but our allies as well. Collaborative international efforts to meet, reduce and defeat the use of chemical or biological weapons have become essential. The United States remains committed to enacting new domestic laws and strengthening treaties and international WMD regimes to prevent and deter CBW development and use. I will highlight those countries not in compliance with their international obligations. The Administration has raised this important issue with a number of countries bilaterally.

Since the worldwide CBW threat is growing in breadth and sophistication, the use of these weapons anywhere in the world would affect the United States. Crude but lethal attacks can be small and could strike us in our homes here or in American communities abroad. More than a dozen nations, including China, Iran, Iraq, Libya,

North Korea, Russia and Syria have the capabilities to produce chemical and biological agents. Former Soviet biological and chemical facilities still exist in Ukraine, Kazakhstan and Uzbekistan, though none is active now. Many have been engaged by U.S. threat reduction programs to try to control proliferation of equipment, materials and knowledge. Nevertheless, it will always remain difficult to assess how successful we have been in preventing proliferation—especially since basic CBW production does not require large, sophisticated programs or facilities. Additionally, the worldwide exchange of information via the Internet facilitates this process.

How likely is the use of CBW?

Compared to nuclear weapons, chemical weapons (CW) and biological weapons (SW) are easier to acquire and the inherently dual-use nature of many goods and technologies needed to produce SW and CW makes their assembly easier. That makes it likely that we will confront such a threat in the future—again most likely by terrorists.

Chemical agent development is threatening, and the development and production of traditional chemical agents may be easier because their formulations are more widespread than biological compounds. The building blocks of any chemical weapons program come from the chemical industry. Precursor chemical procurement can be difficult for a state that cannot produce them indigenously. Nevertheless, World War I-era CW agents are not difficult to acquire and diagrams and descriptions of chemical weapons from expired patents remain available in public libraries or on the Internet.

Virtually all the equipment, technology and materials needed for biological agent research and development and production are available on the open market as well as in the secondary markets of the world. Vaccine research and disease treatment require essentially the same equipment. Because biological weapons are relatively cheap, easy to disguise within commercial ventures, and potentially as devastating as nuclear weapons, states seeking to deter nations with superior conventional or nuclear forces find them particularly attractive. Therefore BW will probably continue to gain importance since it can kill or incapacitate military forces or civilian populations, while leaving infrastructure intact but contaminated. Its great disadvantage, that it can also attack one's own side, may be blunted by advanced vaccination programs. Traditional controls, similar to those used for fissionable material or delivery systems, cannot be effective when dangerous pathogens occur naturally and do not depend on manufacturing settings for production. Procuring BW agents and using them can be done in different ways with different effects. While developing an effective biological weapon is more difficult than popular discussion may indicate, the degree of difficulty depends on the agent chosen and the sophistication of the delivery method. Biological weapons have been developed by states for many operational uses, as well as by terrorist groups.

In addition to direct threats to the American people The United States is vulnerable to indirect attack. For example, the United States relies on modern intensive farming production methods that involve large numbers of healthy susceptible livestock in geographically concentrated areas, a centralized feed supply, and rapid movement of animals to markets. In addition, U.S. crops generally lack genetic diversity, leaving them vulnerable to disease. An anti-livestock BW attack could result in multiple outbreaks throughout the United States before the disease is diagnosed. In most cases, confirmation of a foreign animal disease would result in immediate termination of exports and potential banning of U.S. livestock products by foreign governments, probably accompanied by killing infected and exposed livestock. The economic impact would be enormous; as many as one in eight U.S. jobs is directly involved in some form of agriculture, from food production to delivery to retail sales.

Chemical and Biological weapons have been used throughout history, and we are keenly aware of the recent anthrax attacks as well as past Iraqi use of chemical weapons against the Kurds in 1988 as well as the 1995 Aum Shinrikyo sarin gas attack in the Tokyo subway. The threat is real, dangerous and likely to occur again.

Which nations possess weaponized stocks of chemical and biological agents?

Iraq

Given Iraq's past behavior, it is likely that Baghdad has reconstituted programs prohibited under UN Security Council Resolutions. Since the suspension of UN inspections in December of 1998, Baghdad has had more than enough time to reinitiate its CW programs, programs that had demonstrated the ability to produce deadly CW before they were disrupted by Operation Desert Storm, Desert Fox, and UNSCOM inspections. Iraq's failure to submit an accurate Full, Final, and Complete Disclosure (FFCD) in either 1995 or 1997, coupled with its extensive concealment efforts, suggest that the BW program also has continued. Without inspection

and monitoring of programs, however, it is difficult to determine their current status.

Since the Gulf War Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use at locations previously identified with their CW program. Iraq has also rebuilt a plant that produces castor oil, allegedly for brake fluid. The mash left over from this production, however, could be used to produce ricin, a biological toxin. Iraq has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased. After Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the U.S. bombing, including several critical missile production complexes and former dual-use CW production facilities. In addition, Iraq appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.

UNSCOM reported to the Security Council in December 1998 that Iraq also continued to withhold information related to its CW program. For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq war in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have hidden an additional 6,000 CW munitions.

In 1995, Iraq admitted to having an offensive BW program and submitted the first in a series of FFCDs that were supposed to have revealed the full scope of its BW program. According to UNSCOM, these disclosures are incomplete and filled with inaccuracies. Since the full scope and nature of Iraq's BW program was not verified, UNSCOM has reported that Iraq maintains a knowledge base and industrial infrastructure that could be used to produce quickly a large amount of BW agents at any time. Iraq also has continued dual-use research that could improve BW agent R&D capabilities. With the absence of a monitoring regime and Iraq's growing industrial self-sufficiency, we remain concerned that Iraq may again be producing biological warfare agents.

Iraq has worked on its L–29 unmanned aerial vehicle (UAV) program, which involves converting L–29 jet trainer aircraft originally acquired from Eastern Europe. In the past, Iraq has conducted flights of the L–29, possibly to test system improvements or to train new pilots. These refurbished trainer aircraft are believed to have been modified for delivery of chemical or, more likely, biological warfare agents.

Iran

Iran, a State Party to the Chemical Weapons Convention (CWC), already has manufactured and stockpiled chemical weapons—including blister, blood, choking, and probably nerve agents, and the bombs and artillery shells to deliver them. Tehran continues to seek production technology, training, expertise, equipment, and chemicals from entities in Russia and China that could be used to help Iran reach its goal an indigenous nerve agent production capability.

Tehran continued to seek considerable dual-use biotechnical materials, equipment, and expertise from abroad—primarily from entities in Russia and Western Europe—ostensibly for civilian uses. We believe that this equipment and know-how could be applied to Iran's biological warfare (SW) program. Iran probably began its offensive BW program during the Iran-Iraq war, and likely has evolved beyond agent research and development to the capability to produce small quantities of agent. Iran may have some limited capability to weaponize BW.

North Korea

North Korea has a long-standing chemical weapons program. North Korea's domestic chemical industry can produce bulk quantities of nerve, blister, choking, and blood agents. We believe it has a sizable stockpile of agents and weapons. These weapons could be on a variety of delivery vehicles, including ballistic missiles, aircraft, artillery projectiles and unconventional weapons. North Korea has not acceded to the Chemical Weapons Convention (CWC), nor is it expected to do so any time soon.

While North Korea has acceded to the Biological Weapons Convention (BWC), it nonetheless has pursued biological warfare capabilities over the last four decades. North Korea likely has a basic biotechnical infrastructure that could support the production of infectious biological agents. It is believed to possess a munitions production infrastructure that would allow it to weaponize agents and may have biological weapons available for military deployment.

Libya

Libya continues its efforts to obtain technologies and expertise from foreign sources. Outside assistance is critical to its chemical and biological weapons programs, and the suspension of UN sanctions in 1999 has allowed Tripoli to expand its procurement effort with old-primarily West European—contacts with expertise, parts, and precursor chemicals for sale. Libya still seeks an offensive CW capability and an indigenous production capability for weapons. Evidence suggests Libya also seeks the capability to develop and produce BW agents. Libya is a state party to the BWC and may soon join the CWC, however this likely will not mean the end to Libya's ambition to develop CBW.

Syria

Syria has also vigorously pursued the development of chemical—and to a lesser extent biological—weapons to counter Israel's superior conventional forces and nuclear weapons. Syria believes that its chemical and missile forces deter Israeli attacks.

Syria has a long-standing chemical warfare program, first developed in the l970s. Unlike Iran, Iraq, and Libya, Syria has never employed chemical agents in a conflict. It has a stockpile of the nerve agent sarin and may be trying to develop advanced nerve agents as well. In future years, Syria will likely try to improve its infrastructure for producing and storing chemical agents. It now probably has weaponized sarin into aerial bombs and SCUD missile warheads, giving Syria the capability to use chemical agents against Israeli targets. Syria has not signed the CWC.

Syria is pursuing biological weapons. It has an adequate biotechnical infrastructure to support a small biological warfare program. Without significant foreign assistance, it is unlikely that Syria could advance to the manufacture of significant amounts of biological weapons for several years. Syria has signed the BWC.

Syria depends on foreign sources for key elements of its chemical and biological warfare program, including precursor chemicals and key production equipment. The U.S. has pressed possible supplier states to Syria to stop such trade, thereby making acquisition of such materials more difficult. The 33-nation Australia Group coordinates adoption of stricter export controls in many countries.

Cuba

The United States believes that Cuba has at least a limited, developmental offensive biological warfare research and development effort. Cuba has provided dual-use biotechnology to rogue states. We are concerned that such technology could support BW programs in those states. We call on Cuba to cease all BW-applicable cooperation with rogue states and to fully comply with all its obligations under the Biological Weapons Convention.

Russia

Serious concerns remain about the status of Russian chemical and biological warfare programs, the accuracy of the information Russia provided in its declarations, and the willingness of the Russian defense establishment to eliminate these capabilities. Further, given that Russia still faces serious economic and political challenges and the large number of weapons involved, the possibility that some Russians might sell chemical and biological materials, technologies and knowledge to other countries or groups continues to exist.

Russia has stated publicly that it opposes proliferation of chemical and biological weapons. Because of its economic situation and serious financial shortfalls, Russia remains concerned about the costs of implementation of the Chemical Weapons Convention. It believes the high destruction costs of its large chemical weapons stockpile requires Western assistance.

Moscow has declared the world's largest stockpile of chemical agents: 39,969 metric tons of chemical agent, mostly weaponized, including artillery, aerial bombs, rockets, and missile warheads. U.S. estimates of the Russian stockpile generally are still larger. The inventory includes a wide variety of nerve and blister agents in weapons and stored in bulk. Some Russian chemical weapons incorporate agent mixtures, while others have added thickening agents to increase the time of contamination on the target.

According to the Russian CWC declaration, all former Soviet chemical weapons are stored at seven locations in Russia, mostly in the Volga/Ural section of the country. During the late 1980s and early 1990s, it carried out an extensive consolidation process of chemical warfare material, from sites within Russia and from non-Russian locations.

Russian officials do not deny research has continued but assert that it aims to develop defenses against chemical weapons, a purpose that is not banned by the CWC. Many of the components for new binary agents developed by the former Soviet Union are not on the CWC's schedules of chemicals and have legitimate civil applications, clouding their association with chemical weapons use. However, under the CWC, all chemical weapons are banned,' whether or not they are on the CWC schedules.

The former Soviet offensive biological program was the world's largest and consisted of both military facilities and nonmilitary research and development institutes. This program employed thousands of scientists, engineers, and technicians throughout the former Soviet Union, with some biological warfare agents developed and weaponized as early as the 1950s. The Russian government has committed to ending the former Soviet BW program. It has closed or abandoned plants outside the Russian Federation and these facilities have been engaged through cooperative threat reduction programs. Nevertheless, we remain concerned about Russia's offensive biological warfare capabilities remain.

Key components of the former Soviet program remain largely intact and may support a possible future mobilization capability for the production of biological agents and delivery systems. Moreover, work outside the scope of legitimate biological defense activity may be occurring now at selected facilities within Russia. Such activity, if offensive in nature, would contravene the BWC, to which the former Soviet government is a signatory. It would also contradict statements by top Russian political leaders that offensive activity has ceased.

The United States remains concerned by the threat of proliferation, both of biological warfare expertise and related hardware, from Russia. Russian scientists, many of whom either are unemployed or unpaid for an extended period, may be vulnerable to recruitment by states trying to establish biological warfare programs. The availability of worldwide information exchange via the Internet facilitates this process.

Russian entities remain a significant source of dual use biotechnology, chemicals, production technology, and equipment for Iran. Russia's biological and chemical expertise makes it an attractive target for Iranians seeking technical information and training on BW and CW agent production processes.

China

I believe that the Chinese have an advanced chemical warfare program, including research and development, production, and weaponization capabilities. Chinese military forces have a good understanding of chemical warfare doctrine, having studied the tactics and doctrine of the former Soviet Union. Chinese military forces conduct defensive chemical warfare training and are prepared to operate in contaminated environments. In the near future, China is likely to achieve the necessary expertise and delivery capability to integrate chemical weapons successfully into overall military operations.

I believe that China's current inventory of chemical agents includes the full range of traditional agents, and China is researching more advanced agents. It has a wide variety of delivery systems for chemical agents, including tube artillery, rockets, mortars, landmines, aerial bombs, sprayers, and SRBMs. China signed the Chemical Weapons Convention in January 1993, and ratified it shortly after the U.S. ratification in April 1997.

China acceded to the Biological and Toxin Weapons Convention in 1984, though many believe its declarations under the BWC confidence-building measures inaccurate and incomplete. China has consistently claimed that it has never researched, manufactured, produced, or possessed biological weapons and that it would never do so. However, China possesses an advanced biotechnology infrastructure and the biocontainment facilities necessary to perform research and development on lethal pathogens. It is possible that China has maintained the offensive biological warfare program it is believed to have had before acceding to the BWC.

What is the potential access of international terrorist groups to these stocks and capability to produce and employ CBW?

Terrorist interest in chemical and biological weapons has been growing and probably will increase in the near term. The threat is real and proven. The ease of acquisition or production of some of these weapons and the scale and terror they can cause, will likely fuel interest in using them to terrorize. The transport and dispersal techniques also are manageable and can be made effective easily, as seen recently in using the mail as a delivery system to spread anthrax.

Many of the technologies associated with the development of chemical and biological agents, have legitimate civil applications. The increased availability of these

technologies, particularly if a group is already in the United States and therefore not subject to many of the controls in place that monitor and limit the export of these technologies, coupled with the relative ease of producing chemical or biological agents, makes the threat very real.

In addition, the proliferation of such weapons raises the possibility that some states or rogue entities within these states could provide chemical or biological weapons to terrorists. It remains unlikely that a state sponsor would provide such a weapon to a terrorist group. But an extremist group with no ties to a particular state (but which likely does have friends in state institutions) could acquire or steal such a weapon and attempt to use it.

How well can the U.S. monitor the threat?

The proliferation of chemical and biological weapons continues to change in ways that make it more difficult to monitor and control, increasing the risk of substantial surprise. Countries and terrorists determined to maintain and develop these capabilities are demonstrating greater proficiency in the use of denial and deception efforts.

State programs have been placing significant emphasis on self-sufficiency. In bolstering their domestic production capabilities, and thereby reducing their dependence on others, they can better insulate their programs against interdiction and disruption. Although these indigenous capabilities may not always substitute well for foreign imports—particularly for more advanced technologies—in many cases they may prove adequate.

In addition, as their domestic capabilities grow, traditional recipients of technology could become new suppliers of technology and expertise to others. We are increasingly concerned about "secondary proliferation" from maturing state-sponsored programs, such as those in Iran and North Korea. These countries and others not members of the Australia Group do not adhere to its export constraints. Apart from governments, private companies, scientists, and engineers from countries such as China and Russia may provide CBW-related assistance to countries or terrorist organizations. Weak or unenforceable national export controls, especially on dual-use technology and goods, coupled with the growing availability of technology, makes the spread of CBW easier, and therefore more likely.

Unfortunately, Mr. Chairman, I cannot assure you that we can predict and protect against the threats of CBW attack on the Homeland or American bases, embassies, and interests abroad. The technology for CBW is too widely available and the precursors too widespread for us to track. Such weapons tend to be clumsy, subject to vagaries of wind, weather, and ventilation systems. Moreover, the users rarely have any immunity from them. We must worry, however, that in the hands of a fanatic, CW or BW agents could cause great loss of life.

I look forward to you questions.

The CHAIRMAN. Without objection we place it in the record and I'd suggest if the Chairman doesn't mind we have 10-minute rounds. There's only three of us. We could coherently follow-up on some questions.

Let me say, Mr. Secretary, at the outset, I appreciate the way you have segmented your presentation and in a sense what, Senator Helms obviously he speaks for himself, but what Senator Helms and I are attempting to do in a way, my words not his, is sort of provide a glossary and a vocabulary for our colleagues on how to begin to get a handle on this issue.

We both agree that this is notwithstanding the degree to which we each support or don't support national missile defense and how fast we move it, et cetera. This is, irrespective of that, whether we got full bore or we slow or whatever, we both believe this is an incredibly urgent problem that we have to attend to and it has not, at least speaking for myself, I don't think it's sunk into the consciousness of our colleagues or the country how urgent this concern is.

And so what I don't want to do, though, and neither of us want to do is unduly alarm the public. So we're trying to be as straightforward as we can and to get down if we can and we're going to

have many of these hearings, try to determine whether there's an emerging consensus among you and your colleagues behind you and others in this country and around the world as to what are the most likely threats, what are the things, how likely are they and what do they have to be in combination with to come to fruition.

And that's why I quite frankly like your, as you said it was your way of looking at it, battlefield weapons, terrorist weapons and weapons of mass destruction. And so as I go through my questions here, I want you to understand that if you know the purpose, you may be able to help me if I don't ask the question precisely the way to elicit the answer that you being around this place long enough know I'm trying to—the issue I'm trying to get my arms around.

And so you had indicated that in your statement, you talk about the various things we can do to deal with all of this including, and I'll get back to it, an arsenal of response including arms control being part of the mix, but let me leave that aside for the moment.

Why would, in a generic sense, why would a terrorist group like al Qaeda, let's just pick al Qaeda. Why would a terrorist group like al Qaeda in your view need the help of a state, a sponsor in effect, to be able to utilize a chemical and biological weapons of mass destruction?

Your definition of that is it kills a whole lot of people. Anthrax is not a weapon of mass destruction necessarily at least as was use of the mail, but obviously certain pathogens released into the atmosphere in sufficient quantities, obviously certain chemical weapons dispersed in sufficient quantities could in fact have a devastating impact in terms of the number of people killed.

So just muse with us a moment why for the bigger bang for the buck for the real serious fall out why would an al Qaeda need, hypothetically, one of the states we mentioned to be sponsor, in effect, to their effort?

Mr. FORD. Well, I must make it clear that I'm not expert on chemical and biological weapons and I obviously, like you, have been compelled to try to think about this issue more and more, particularly after 9/11.

My sense is that getting ahold of small quantities of chemical and biological weapons material is difficult but clearly within the capability over time for major terrorist groups like al Qaeda, Hezbollah and others. And we've seen in several places in the world that people are crazy enough or committed enough to blow themselves up or to kill themselves in order to make a point.

And when you talk about a few dozen people, or even a few more than that, those types of actions are quite possible by terrorist groups because you don't have to have the organization and planning a sophisticated device. It can be a very primitive device equivalent to the conventional weapon of strapping dynamite around your waist and going into a pizza restaurant and blowing yourself up.

And I don't belittle that because as we saw with anthrax, it has a huge impact. If that happened in Detroit or if it happened in LA, it would have a huge impact on Americans' perceptions of their safety and be concerned about what happened to their kids.

Having said that, I think that many of us believe that the preferred weapon for terrorists right now would still be some sort of

conventional explosion. They can kill a lot more people a lot easier than they can with these exotic chemical and biological weapons and probably have less chance of blowback or impact on them. And so that blowing up a school, attacking a sports event, if you want to have an impact, you probably can do that a lot easier than you can with trying to use a chemical or biological agent.

If you're trying to think about how to poison the water of a major metropolitan area where tens of thousands of people could be killed or if you're trying to think about how you would kill over time a large number of people on the East Coast with some sort of disease, we're really talking about a sophistication in packaging and delivery and organization that I think even nation states would have difficulty putting together.

There's a logistics and organizational requirement that you can try it, but you'd probably fail if you're not careful. So that it's the sophistication of the weapon, the sophistication of the delivery means that while best done by terrorists, probably is beyond their planning and scientific capability to put together effective weapons of mass destruction.

One of the states or a group within a state could prepare that, but not want to be fingered as being the culprit and could pass it on to a terrorist group. I think at least in my mind, that's a more likely scenario than al Qaeda's thinking this up all by itself.

Now, having been one of those who probably would've said you gotta be crazy if someone came and said I think they might fly an airplane into the World Trade Center and the Pentagon, so part of the problem for us in the intelligence community is thinking the unthinkable, the things that might occur even if we don't have much faith that it could.

But I still believe that it's more likely that they would have to have the aid of some state or some group within a state to pull off the major weapons of mass destruction sort of effort successfully.

The CHAIRMAN. To put this in context, I asked in the middle of the anthrax scare and I think it was when our distinguished doctor colleague was talking to a joint caucus of Democrats and Republicans, Senator Frist, and I remember asking the question about not of Dr. Frist, but of some of the intelligence people about the ability to pollute a water supply in a city to such a degree that thousands of people would die.

And what I wanted to deal with was the image in my home state of people thinking someone could take a little vial and pour a vial into the reservoir near where I live or in the Brandywine River where we get our drinking water and thousands of people die. The truth is that is not possible. There is no such little vial that I'm aware of. You're talking about tons of material being dropped in some cases, so your point being it is not all that easy, but we have to anticipate this possibility occurring.

I'm going to come back in the second round and ask you a few questions about the intelligence community's assessment of motivation for these countries. For example, unrelated, assume Iran were a thoughtful democracy. Were I Iran, I might very well be doing what Iran was doing because of what Iraq did to me. It's harder for me to understand why Syria might, but any rate but I'll come

back to that. I yield to the Senator from North Carolina, Senator Helms.

Senator HELMS. Mr. Chairman, there was a time when I accepted all of these so-called problems as problems that we ought to be looking at. These are just as important and so forth. It ain't so.

You think of it in terms of your children and grandchildren and what they are facing on this kind of problem and then you have a wake up call. I remember when Sam Nunn and Jim Woolsey came here that day. That was sort of a wake up call. I don't know whether you know about that or not, but they had visited the sites and the laboratories in Russia where all this is going on.

So Russia's not just fooling around with it. It may not be that we are just not fooling around with it, too. I don't know, I confess, the extent to which we are doing it, but we are headed toward the possibility of something very bad. Now, the most recent national intelligence estimate indicates, we talk about Syria and Iran and Russia's assistance to those two countries, and I just wondered what difference would it make if Russia were to cease its proliferation, total proliferation, what impact would this have on the development of chemical and biological programs in just these two countries?

I think that's the way to put it in perspective. How much good would it do if they stopped doing it for those two countries?

Mr. FORD. Well, I think it would make a considerable difference. I would simply add to your thought that as I was talking to our friends in Moscow, I think we ought to talk to our friends in Europe and——

Senator HELMS. You mean——

Mr. FORD [continuing].——ask them to do the same thing. Because I think this is one of those cases where it's not just Russia and China, ones we sort of look to first for giving these things to countries in the Middle East, but also in terms of chemical and biological weapons, often the most critical pieces of technology or shipment are from our friends in Europe.

Senator HELMS. Let me go back to my original premise. Do we have any evidence that terrorist organizations have been able to acquire chemical and biological weapons from Russia? Now, we've had all sorts of meetings on the fourth floor, Joe, but I have never heard that question answered to my satisfaction.

Mr. FORD. You know, I'm not sure that I—I can't really go into any details, but my sense is that during the Cold War, during the Soviet Union period, that particularly Russian chemical defense and biological warfare defense capabilities were shared with many of their allies and friends.

For most of the countries who have been doing offensive BW and CW, it starts and is often done under the cover of defensive activities, chemical warfare, biological warfare. So I don't know, I can't give you the exact answer that the Soviet Union did, but they clearly were helpful in providing chemical and biological weapons information to a whole host of countries that modeled themselves after the Soviet military forces.

Senator HELMS. You have made my point. You have made my point. Neither do we know. And I've asked the question and they would get back to me and all that sort of thing. Now, what is our

intelligence estimate of the likely use by Iran of these dangerous—I'll only just pick out one. What's the likelihood that they would do it?

Mr. FORD. And the important variable there is the what. What would they do? I think that Chairman Biden suggested that one of the reasons that motivates Iran is the concern about past conflict with Iraq so that some of their chemical and biological activities are designed as a deterrent or possible use against Iraq should it attack Iran.

I think there's also the concern on the part of the Iranians that if there should be a conflict with Israel that both Israel and the United States would be involved and that our superior conventional capabilities would need to be deterred in some way or hope they could deter it in some way so they would also be motivated to——

Senator HELMS. Of course, they got to think of tit for tat, too. You know, what are they going to do to their own countries and this is a factor that's almost impossible to apply. Now, I don't want to leave our friends in Beijing out of this thing, you know. What's happening there? What are they doing to proliferate if anything?

Mr. FORD [continuing]. In terms of proliferation, the record is not clear and particularly we probably could go into somewhat more detail at a classified level. I think that they have been more involved in dual use and things that could be used by a recipient for chemical and biological. I have no evidence that I know of that they have provided chemical weapons or biological weapons——

Senator HELMS. Nor do I.

Mr. FORD [continuing]. They develop for themselves. That has something—China hasn't done that.

Senator HELMS. Well, we keep mentioning Iraq and we forget, I think, that there are a hell of a lot of folks over there who don't like Saddam Hussein and if we or somebody or everybody should concentrate on getting that guy out of there, I think Iraq would be once more one of the countries that we can most rely upon because these folks come to see me and I'm sure they come to see every Senator and House Member, but they are pleading for help and it's difficult to know how best to help them.

Now, Joe mentioned and you did, too, I think, the biological agents and chemicals that Iraq is trying to acquire. What type specifically, do you know that, are they trying to acquire?

Mr. FORD. I would have to take that question and get back to you. Primarily because any details like that would have been acquired through collection of intelligence and I'll have to just take the question if you don't mind.

Senator HELMS. Very well. I'd like for you to check your sources and let us know what you find out. Now, back to cousin Saddam Hussein, I think he's continuing his ballistic missile program. We have some indication of that. I will not go further in describing what the indication is. And I wonder if you have any feeling about how far if anything he has been able to do to weaponize these chemo-bio-agents, I suppose you call them, into warheads and that's the ultimate answer to what the danger question is all about.

Mr. FORD. Well, both simply by chance and also by emphasis, we probably know more about Iraq's chemical and biological weapons programs than many of the other countries that we're looking at.

Senator HELMS. I think that's right.

Mr. FORD. And it's at least in terms of chemical weapons, not only do we know that they have built them in the past, as I suggested they had used them in the past, but there are suspicions based on our inspections and our discussions with Iraqis over many years that there are a lot of weapons that they can't account for.

So there is a large consensus that in fact, while I may not be able to prove it to you today, I certainly believe that they have a stockpile of chemical weapons weaponized ready to go if they should need them.

Biological agents are somewhat more problematical, but I think that most people that look at Iraq on chemical, biological and nuclear will—if they don't have it now, they're working on it and that if given lifting of sanctions or some major change that it makes it a little bit easier for them they will have them and that the moment that they are no longer under international controls that they'll have the whole range of weapons. And we see the activity, we see the emphasis, we see the resources, we see the brain power——

Senator HELMS. All right.

Mr. FORD [continuing].——It's made difficult for them because we're all watching very closely, but they're still trying.

Senator HELMS. No wonder John Glenn was so smart when he was in the Senate. One final question yes or no, does the United States have the ability to detect biological and chemical weapons being smuggled into the United States?

Mr. FORD. Sir, I don't know, but that's a good question and I will try to get you an answer.

Senator HELMS. Okay. If you'll do that. Thank you, sir.

The CHAIRMAN. Senator Lugar.

Senator LUGAR. Well, thank you, Mr. Chairman. Secretary Ford, in your concluding statement of your prepared testimony, you say, "I cannot assure you that we can predict and protect against the threats of CBW attack on the homeland" and you point out, that an attack could cause great loss of life.

Isn't the whole thrust of the Administration's new policy to address these threats and reduce the possibility of such attacks occurring? By that I mean opening up the countries that have weapons of mass destruction.

At the heart of the war against terrorism, it seems to me is the thought that we must gain international transparency with regard to Iran, Iraq or others or we are going to have war. We're going to have military force employed. In other words, the President is saying this is not something you sort of wait around for for years and maybe it develops, or maybe it doesn't. This is a critical point in history.

A lot of our allies and members of the coalition in Afghanistan are very nervous about this. They have the same estimate you have this morning. We're all vulnerable, but they're worried the President is serious about eliminating the intersection of terrorist cells and weapons of mass destruction and that this policy could lead to a long war.

I suppose what I'm probing for this morning is, is there a sense and presentation of all this by the Administration so that the

American people understand what's at stake here; or are we likely to have a lot of hearings about who has what, and how they got it; or are we going to aggressively remove the source?

As I understand the quarrel with Iraq, there is no international transparency with regard to possible WMD stockpiles. Leaving aside Saddam Hussein and the past there, the international community shares our concerns. They want to know what Iraq has in their stockpile.

So, people from Iraq have gone to see Kofi Annan, Secretary General of the United Nations, offering some arrangement, but apparently it was unsatisfying to everyone, including the Secretary General. Eventually, if Iraq says, "No you cannot come in, we are going to deny you knowledge of what we are doing," then it's likely to precipitate military action and we will find out what's occurring.

I think that there has to be some sense, not necessarily in your testimony, but in the overall discussion of this problem that we're in a war and the objective is to establish transparency. And the importance of doing that is tremendously vital to changing the whole picture.

As you point out, there could be individual terrorists or groups of people who get their hands on some dangerous material and kill people. But as you're pointing out, it's very difficult to poison the whole reservoir or to kill tens of thousands of people in a city without having a fairly active organization. If not a state at least some portion of a government or some apparatus, some infrastructure.

I think we have the ability to stop that if we have the political will to do so. We will remove the opportunity for groups to organize and establish themselves.

This is just a personal editorial, but it's precipitated by the thought, as you've said, this is a gloomy subject and it is, but it's brighter because we're alert. We're not passive as we might have been if you had testified a year ago. We're prepared to do something about it.

We can do something about it in a big way with Russia now. Here is a country that in terms of chemical warfare is somewhat cooperative, and 40,000 metric tons of weapons are reasonably secure in seven locations with Russians and Americans providing security. And the Russians having a palpable fear of the results of the stuff getting out, as we do, to Chechens or others in their own country where Russians would be killed.

But the problem, as you pointed out, is the deadline for the Chemical Weapons Convention may not be met in 2012, and it comes down to money. There hasn't been very much in the Russian budget for this. Now, the current Duma has appropriated some money, and Congress has stepped forward. So at Shchuchye, there may be in fact some action this year to start destroying those weapons.

Although it may be true that nerve gas and other types of weapons are hard to circulate, I observed in Shchuchye as perhaps you have that there are 2 million hells being stored there. I put three 85mm shells in a thin suitcase that somebody could carry out of the place. Now nobody's going to, we're guarding it, but these weapons are easily portable.

For a long time it's been hard for some of us to convince our colleagues that we ought to cooperate with Russia and destroy these weapons. Some feel that the Russians made their bed, let them sleep in it. It's expensive to do. Why should American taxpayers destroy the first one of those shells? But I think we're over that hurdle. We sort of understand that the stuff is portable and proliferation could occur.

What is the Administration's general thrust with regard to this whole problem? It's been an ordeal getting to one of the seven locations. We know where they all are. We now agree that 95 percent of the problem is in Russia and they have a reasonably cooperative government, but is there an organizational thrust or a budget thrust on the part of our Administration to get to the source? Find out about it, work with people to destroy it.

Mr. FORD. Senator Lugar, as I know you appreciate, intelligence officers are very good at telling you that the sky is falling. We're not so good at telling you how to protect yourself from that or what you need to do. And it may seem like a cop out, but in fact it really is a different job and I will tell my colleagues at State that they should come down and brief the committee or see you personally and talk to you about what we intend to do about this.

What we are telling our policy colleagues is that this is one you can't go to sleep on. That everything that we see is that a proliferation of these very dangerous capabilities of chemical and biological weapons both by states and by terrorist groups and that given that proliferation, the chances for use are increasing and that if they are used, we'll never forgive ourselves if we don't do something about it.

I have to tell you that I still am more worried by a nuclear attack than I am a chemical or biological attack. I think that terrorist use of these weapons can occur, and I would mourn the death of even a few people; but I would also hate to wake up one morning and realize that instead of just the World Trade Center disappearing that New York City had disappeared or Washington or some other place and that either by an accidental launch or by some five crazy guys that get a hold of an ICBM from one of the nations that have them and shoot it at us.

But that's not say that biological and chemical aren't dangerous. They are. And they're very difficult to deal with.

Senator LUGAR. Let me just to say in the limited time I have that I think nuclear probably is a greater threat, but since we're concentrating today——

Mr. FORD. I understand. I understand.

Senator LUGAR [continuing].——on chemical and biological. With the biological, we have a very talented man working for Nunn-Lugar in the Pentagon now, Andy Webber. His exploits have been told by Judy Miller in her book, "Germs." He has visited many biological facilities and made it possible for people like me to get into them.

I mention this because the sharing of information about what we have found has not been very wide. I point out anecdotally as I visited with British Intelligence on the way back from NATO in January, they were amazed that we physically had been wandering

around biological facilities, examining the contents, trying to put some security beyond barbed wire around some of these places.

I think you know with our NATO allies, with our European friends, there's potential for a great deal of cooperation, as we simply clue them in as to what we know with regard to chemical situations, too. The degree of intelligence perspective in all these things is very uneven and I think we have the benefit of being far ahead in that respect due to the intrusions, but the——

Mr. FORD. But I think some our NATO and European friends are in fact helping very much with Russia——

Senator LUGAR. Right.

Mr. FORD [continuing].——in destruction and control of the chemical weapons.

Senator LUGAR. They have indeed; and the Germans and the Norwegians, the Canadians, the British all have stepped up now to the Shchuchye project, probably because of your efforts and those at State. I applaud you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Senator Frist.

Senator FRIST. Thank you, Mr. Chairman and thank you, Secretary Ford for an outstanding perspective to what I think is one of the most pressing issues of our time. And that is the threat of biological, and chemical, but biological terror, in part because unlike the nuclear, we don't fully understand biological terror.

We saw the assault of anthrax on our soil and we were unprepared. We were unprepared for that. This hearing is very important because it shows the rich matrix involved that is our international intelligence which really hasn't done a very good job in speaking, I believe, to our public health system. There hasn't been the need to in part because the science hadn't been there. We weren't fully aware that the technology of weaponization is in the hands of others and it is this far developed as it is.

And I applaud the Chairman and the Ranking Member to paint this much larger picture and then it's incumbent upon us in the United States at Congress with the leadership of the Administration to weave this story together in such a way that families listening to this testimony around this country feel secure and feel safe and know what to do.

One area we haven't talked very much about I'd like to come back to after I make a few more general statements is the whole issue of smallpox because I don't want us to leave this hearing and think that it does take a large state or a lot of money or a lot of sophistication. Because it doesn't and that's what's unique.

In terms of biological weapons, these germs, these bacteria, you don't see the weapon. It doesn't take very much money. They spread themselves. They can be contagious, not all of them are. The perpetrator is long gone. The weapon, you can't smell it, you can't see it, you can't touch it, you can't taste it and the victim may be six or seven days later, plus that victim can spread the germ to other victims.

As a nation, I don't think Americans are fully aware of the risk. In your written statement, "Terrorist interest in chemical and biological weapons has been growing and probably will increase in the near term. The threat is real and proven." You said it in your oral

testimony as well, but it's very important that we in Congress hear that and I would say that local elected officials and local governments hear that as well because they're the ones who are going to respond.

It's not going to likely be the military where conventionally we think in response to these terrorist assaults. America's not yet aware of how real the threat is, even in spite of anthrax which hit here in Washington, the East Coast and Florida and New York and Connecticut.

Your statement that it's increasing or that the threat is real and proven and probably will increase is important for America to hear as well. We haven't seen it yet. I don't know what's going to come, but a terrorist whose purpose is to terrorize, to put fear, to paralyze infrastructure now know that it works. Before anthrax we didn't know. Now they know it works even though anthrax in the large scope of things was quite small. I say that because I think the risk is real, that it's increasing, that we remain vulnerable today.

We're responding as a government, but we still remain underprepared. The intentional release of potentially deadly bacteria and viruses or poisonous agents or chemical agents that we're talking about is a reality today. Ounce for ounce, whether it's anthrax or whether it is smallpox, these are among the most lethal weapons of mass destruction. They're more powerful than the hydrogen bomb today potentially, that can be used and if you're a terrorist and you know that, it gives you great strength if your purpose indeed is to terrorize.

There have been many past studies that we kind of put aside that we use as a call to action, but I think we need to go back and look at those. In 1993, the Office of Technology and Assessment estimated that under the right atmospheric conditions, dispersion by an airplane of 220 pounds of anthrax spores over Washington, D.C. could result in up to 3 million deaths.

Well, we're much better prepared today I believe with the way government has responded, with the stockpiles of medicines, but what about smallpox. We didn't go into the agents today, Mr. Chairman, but what about botulinum toxin? We will in the second panel. Or tularemia or the plaque which has wiped a larger percentage of the population than any disease. These agents have been identified by our intelligence community and now we need to communicate with America to make sure that we do appropriately respond.

As we've heard and will continue to hear, the threats from biological agents are real. The terrorist groups have the resources. They have the motivation now we know to use germ warfare and indeed, we need to recognize as a country as we merge our foreign relations, our intelligence, our foreign policy with what goes on here at home, the weapons of choice in the wars of the 21st century may well be botulinum toxin, anthrax and smallpox.

You mentioned al Qaeda. Osama bin Ladin has said publicly that it is his religious duty to acquire weapons of mass destruction including biological and chemical weapons. I appreciate you going far in saying what evidence we have to date, but in truth as you well

said and even implied, there may be more than we know today and we're aggressively looking in that arena.

People say why today and in part it's because of these rapid advances in agent delivery. We know that other nations have loaded warheads, Scud missiles with biological weapons, or you know that and we on the panel, but a lot of America doesn't know that. It's all ready been done. They've been loaded. They haven't been fire, haven't been sent, but that's how far along.

Technology's advanced even since that point in time in terms of how to deliver these agents. Mr. Chairman and Senator Helms, I think are doing a tremendous job and I look forward to working with them on their bill, the Global Pathogen Surveillance Act of this year. It's a bill I've studied that is very, very important as we look at both emerging potential agents as well as agents that we know of today.

This whole issue about are we prepared as a nation is important. Again, that's why today's hearing is so important because physicians are not trained to recognize these agents. Physicians are not trained to look and see what smallpox is. The anthrax rash, we've simply not been trained to look at that in the past.

Every moment counts here because how quickly we pick up and diagnose pretty much defines how quickly we can stop the spread. Therefore, I think it is very important that you brief us either privately or otherwise what are the seven agents? How real is that risk of smallpox? And I'll come back and close with a question on this, but smallpox, it takes one person and if that person's infected and they go to an airport, they can infect 10 people and those 10 people can be all across the United States of America.

So it really does go tracing it all the way back. We don't have enough vaccine today. Period. Now, I said we don't have enough vaccine to vaccinate everybody today. We do have enough vaccine I think to respond appropriately, but we're not going to have what we're going to have in a year from now. So in the meantime, it's important for us to know who has the smallpox virus. It's been eradicated as a disease, but who has that virus?

And I'll close with that question for you and I know you probably can't answer that fully right now, but it is important for us to know.

Let me just say because now I've sort of painted this picture that I'm concerned about that we are responding as a government. It's been remarkable to me since October. We passed a Bio-terrorism Preparedness Act of 2001 that the Senate passed. It sets a comprehensive framework for responsiveness. The President and the Congress has responded by increasing funding to about $3 billion from about $500 million in one year. That money's down to the local level. In the President's budget, it will be going up to about $6 billion if we approve that aspect of his budget, which I'm very supportive of as we go forward.

With that and I'll ask that my opening statement be made a part of the record in its entirety.

The CHAIRMAN. Without objection it will be.

[The prepared statement of Senator Frist follows.]

PREPARED STATEMENT OF SENATOR BILL FRIST

We are here to address one of the most pressing issues of our time—the threat of chemical and biological terror. America is not aware that the risk is real and significant. We are vulnerable. We are not unprepared, but we are underprepared.

Biological and chemical terrorism, the intentional release of potentially deadly bacteria, viruses, toxins, or poisonous chemical agents, are a terrifying reality. Ounce for ounce, biological agents such as anthrax and smallpox are among the most lethal weapons of mass destruction known. In 1993, the Office of Technology Assessment estimated that under the right atmospheric conditions, dispersion by airplane of 220 pounds of anthrax spores over Washington, D.C. could result in up to 3 million deaths. And as we know all too well, the mailing of anthrax-laced letters last fall infected 18 people and killed five innocent Americans.

As we will hear today, the threats from biological and chemical agents are real. Terrorist groups have the resources and the motivation to use germ warfare. The weapons of choice in the first war of the 21st century may be tularemia, smallpox, ebola, botulin toxin, and anthrax. But this should come as no surprise. Osama bin Laden has said publicly that it is his religious duty to acquire weapons of mass destruction, including biological and chemical weapons. Rapid advances in agent delivery technology have made the weaponization of germs much easier. Finally, with the fall of the Soviet Union, the expertise of thousands of scientists knowledgeable in germ warfare may be available to the highest bidder.

Bioterrorism remains a significant threat to our country. Exposed individuals will most likely show up in emergency rooms, physician offices, or clinics, with nondescript symptoms or ones mimicking the common cold or flu. Most likely, physicians and other health care providers will not attribute these symptoms to a bioweapon. If the bioagent is communicable, such as small pox, many more people may be infected in the interim, including our health care workers. Experts say it may take as long as 24 to 48 hours after a bioterrorist attack occurs before federal assistance can arrive, making it the critical time for preventing mass casualties.

Unfortunately, as we also will hear today, America is not yet fully prepared to meet the threat of biological warfare. Great strides have been made in the past three years; but there is much more to be done.

It is a frightening but true fact that a biological or chemical attack on our soil could be even more deadly and destructive than the recent attacks on the World Trade Center and the Pentagon. Biological weapons, in particular, pose considerable challenges which are different from those of standard terrorist weapons. The delayed onset of symptoms, difficulty in tracking the source of an attack and high communicability are among the factors that make bioterrorism a real and serious threat. A terrorist attack using a deadly infectious agent—whether delivered through the air, through our foods, or by other means—could kill or sicken millions of Americans.

To counter this threat, a substantial new federal investment in our public health infrastructure, increased intelligence and preventive measures, expedited development and production of vaccines and treatments, and constant vigilance on the part of our nation's health care workers is required.

Recently, legislation I introduced, with Senator Kennedy, to help prepare to meet this threat was signed into law. The "Public Health Threats and Emergencies Act of 2000" provides a coherent framework for responding to health threats resulting from bioterrorism. It authorizes a series of important initiatives to strengthen the nation's public health system, improve hospital response capabilities, upgrade the Center for Disease Control and Prevention's rapid identification and early warning systems, assure adequate staffing and training of health professionals to diagnose and care for victims of bioterrorism, enhance our research and development capabilities, and authorizes additional measures necessary to prevent, prepare, and respond to the threat of biological or chemical attacks.

The Frist-Kennedy "Bioterrorism Preparedness Act of 2001" builds on the foundation laid by the "Public Health Threats and Emergencies Act of 2000" by authorizing additional measures to improve our health system's capacity to respond to bioterrorism, protect the nation's food supply, speed the development and production of vaccines and other countermeasures, enhance coordination of federal activities on bioterrorism, and increase our investment in fighting bioterrorism at the local, state, and national levels.

The Congress and the Administration has now provided an additional $1.4 billion for these activities; the vast majority of these funds would go toward a one-time investment in strengthening the response capabilities of our hospitals, health care professionals, and local public health agencies that would form the front-line response team in the aftermath of a bioweapon attack.

Arms control negotiators have used the term "dual use" to refer to biologic production facilities that have the potential to be used by some countries to produce vaccines for children one week and then produce bacteria or viruses for biologic weapons the next. But we can also use the term "dual use" differently: The same infrastructure investments used to prepare our public health communities, doctors and federal agencies to detect, diagnose and respond to smallpox epidemic resulting from a biologic attack can also be used to detect and respond to outbreaks of natural occurring diseases like West Nile.

In addition to strengthening our defenses against a bioterrorist event, the improved public health capacities resulting from preparation and planning will lead to substantial health benefits in dealing with inevitable natural occurrence of emerging infectious diseases.

Last fall, the GAO released a report, "Challenges in Improving Infectious Disease Surveillance Systems," requested by Senators Leahy, McConnell, Feingold, and myself. It concludes that global disease surveillance, especially in developing countries, is woefully inadequate to provide advance warning about newly emerged diseases, including antibiotic-resistant tuberculosis, or the suspected use or testing of dangerous organisms as bioweapons. Not only would improving international surveillance networks and capacities help poor countries meet their health care needs, it is in our own security interest to know about emerging threats if we are to appropriately respond quickly and effectively.

It is essential that we take steps immediately to fill the gaps in our nation's defense and surveillance system against chemical and biological terrorism, as well as our public health infrastructure. It is essential that Congress to take the steps necessary to make sure that our nation is fully prepared to respond to any threat to our people. I look forward to working with my colleagues to meet these goals.

Senator FRIST. Secretary Ford, again I thank you for your overall presentation. On smallpox itself, is it an agent that we should be worried about today in terms of international terrorism including terrorism on our soil here?

Mr. FORD. The very simple answer, Senator, is yes, very much so. The work that you and others in the Congress have done—at least from an intelligence officer's perspective—has not only been important, but better late than never. This threat has been growing for some time and we can't warn you enough that the threat is real and that it's going to come and that we're going to need to be prepared.

At least from the intelligence community, we're trying to warn you also that we can't see all of this. We're not going to be able, unless we're lucky, to give you the sort of specific tactical warning that you need. That should suggest to most people that we have to get ready.

Now, I don't know any intelligence officers who aren't of a very—their view is that we should defend as much as we can; public health, homeland defense, increase the protections at the borders, et cetera. But most of us believe that we can't rest just on defense, that we have to be aggressively going out and with all of our diplomatic and economic—and military, if necessary—means deal with the problems of terrorism and those countries that are supporting terrorism and weapons of mass destruction.

And that it's this combination of preparedness at home, being smarter, the public understanding what the dangers are, the realistic dangers and understanding the exaggerations that have been made in some cases. But also we need to know that we're going to have to go get people. We're going to have to continue to arrest terrorists. We're going to continue to have to push diplomatic measures to try to get a handle on this.

But it's not one we can just ignore any longer. We can't just walk away from it. This is one that if we are faithful to our children and

our grandchildren, this is one we're going to work on from now on. And unfortunately there's no easy answer. There's no simple answer. Just simply the interest that you and the others on the committee have added an important step in the right direction.

Senator FRIST. Thank you, Mr. Secretary. Thank you, Mr. Chairman.

The CHAIRMAN. Let me follow-up with just a few questions and I invite any of my colleagues to either interrupt me and or add their own questions and I'll be brief.

As usual, Senator Lugar stated it most succinctly, transparency or war. And I think that's really the choice that we're going to have to make and the decisions that others are going to have to take in terms of whether we mean it. With regard to transparency, has the intelligence community done an assessment as to what kind of inspection regime would be needed in Iraq to satisfy us that there was transparency?

Mr. FORD. There is not a formal intelligence community assessment of that. I'm sure that various intelligence agencies have thought about this and written things. We in fact in INR have just completed in the last week our own assessment of what would be needed in an inspection regime, but we did it almost as a target to shoot at rather than a policy prescription. It was, if you're going to ask us to monitor and verify, here is what we need from an intelligence perspective. And we'd be happy to—it's classified of course, but we'd be happy to share that with the committee.

The CHAIRMAN. After consultation with the Ranking Member, what I'm going to hope we can suggest and I'm sure we can, with plenty of advanced notice to our colleagues, a couple, a series of closed hearings——

Senator HELMS. Amen.

The CHAIRMAN [continuing].——on matters that we raised with regard to the nuclear concern two weeks ago, a week ago as well as this. But in open session, one of the things that seems to me, as you just said Carl in response to Dr. Frist, or to Senator Frist, you said that this is something we're going to be trying to get our hands around, this is something we're dealing with on a daily basis if we're serious for a long time to come.

One of the difficulties that I'm having here is it seems to me, at least on it's surface, there are certain things that we are able to do with a fair degree of reliability and there are certain things that we can do where we can measure, we can measure the results even though we can't guarantee that after a full accounting, we've taken care of everything.

And I keep coming back to a place my friend from Indiana has spent a lot of time thinking about in Russia, keep coming back to Russia. There's certain obvious, clear, able to be delineated concerns that unlike with regard to Iraq, unlike Iran, North Korea, Libya or any other place, there is at least in part a willingness to genuinely cooperate, genuinely cooperate.

And so I'd like ask a few very just very pointed questions that you may be able to give very short answers to. If you can't, I can defer it to a closed session.

What is the INR's assessment of A, the willingness and B, the capacity with our financial and professional assistance of the Rus-

sians to corral and destroy some of the 40,000 tons of their chemical weapons that they have?

My impression is they mean it. My impression is they desperately need help. My impression is notwithstanding the fact we talked about them participating, their entire defense budget is about $5 billion this year. I mean, I wish Americans would think about that.

Let's assume they're lying by a factor of 10. Let's assume they're lying by a factor of 20. They're still one-third to one-quarter with gigantic lies what our defense budget is. But if our estimates are correct that it's about $5 billion, then I don't think it's at all realistic that they're going to be able to "chip in." And why is it not in our interest I keep asking myself, for us to spend 8 to $10 billion to wipe out a significant portion of the chemical capability that exists there?

So my question is again, have you assessed their willingness to genuinely cooperate in that effort and B, do we have the combined capacity to destroy a significant portion of this chemical stockpile if we're willing to spend the money?

Mr. FORD. My assessment is similar to yours that the Russians clearly would like to be rid of this problem and that they are willing to cooperate in destroying these chemical weapons capabilities. Partially for the same reasons that we have of the fear of—you have so many of these. As Senator Lugar pointed out, they're afraid that they're going to lose some of them, somebody's going to steal them, somebody's going to sell them and so that they'd like to have them off their hands. They also are clearly understanding that many of these weapons are deteriorating and that they are a costly logistic problem in the future for them. Forget all the good things that would happen if they got rid of the weapons. And the best that we can tell is that the real issue—well, there are always some on any side that are suspicious of the U.S. or should we really do this, but clearly the Russian government is prepared to take this step, but they can't afford it. It's too expensive and——

The CHAIRMAN. It's much more than that.

Mr. FORD [continuing].——they're going to have to get some help from us or the international community or they're not going to be able to do it certainly on the time schedule that we'd like to see them do it.

The CHAIRMAN. There's much more to pursue about that and I'll do some of that in writing. Let me conclude by asking what is INR's assessment of the allegations some of the Russian entities that still are engaged in, that existed for biological research and development, if not the military, are conducting active biological weapons programs in contravention of the Biological Weapons Convention and why have the Russians in INR's view refused U.S. requests for access to four military institutes working on biological research activities? If you have an assessment.

Mr. FORD. I do and I don't. I do in the sense that I could talk to you about this in a little more detail at a classified level. My unclassified answer is that I think that biological weapons research is a serious and embarrassing subject for a lot of people and that even if they have changed their mind about the use of biological weapons and would like to be rid of them as we would, they prob-

ably have fibbed to us a little bit or fibbed to some people about it and they don't want us to find out the extent of their program.

And I think it has more to do with embarrassment of what they had up their sleeve and what they were doing rather than a desire to keep a capability back and use it against the Unites States at some point in the future.

The CHAIRMAN. I thank you for the answer. For what it's worth, I agree with your assessment, because I think about how reluctant we are about any intention or desire or plan now or in the future to ever use biological weapons. The American public would be in this day and age in 2002, shocked and abhorred by knowing what we considered trying to develop in 1950 in '60 in '70 and so—but any rate, I thank you very much. We look forward to you in a closed hearing, but I yield to Senator Helms or any of my colleagues.

Senator HELMS. I'll be very brief. Thank you, Mr. Chairman. This question was obviously handed to me by the lady behind me and it's important. Let me go back a little bit. The first President Bush called me one day and said I want to go to one of your universities involved in a very interesting study. Have you got such a university? I said what city you want to go to? I said in Raleigh we have North Carolina State University and it's great and he said, let's go there.

So we went there to the university where they were learning all about a number of things that we are talking about, Mr. Chairman, and I looked around at whom we were supposed to see and all but one of the students, and they were the top students, were not Americans. They were Chinese. I had a Russian and so forth and so on.

So the question that Miss Patty passed to me, is there any available evidence to indicate that foreign nationals are coming to American universities, earning degrees in biology or chemical engineering and taking this knowledge back to their home countries to use against us? And the answer to that I believe is of course.

And I haven't even thought about what we should do about it or what we could do about it, but we're training a lot of these people to go back and do the things to us that we don't want to do to them and we don't want them to do to us. So give that some thought and let's talk about it one day.

Mr. FORD. Yes, sir.

Senator HELMS. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Lugar?

Senator LUGAR. Well, thank you, Mr. Chairman. Let me just join Senator Helms in this colloquy. Same problem persists at Purdue University where there are almost 5,000 people involved in engineering chemistry. The scientific situation's sort of an equivalent to North Carolina State in Indiana.

I visited with the president of Purdue about this at great length because it's a tradeoff. It's very tough. On the one hand, a case could be made that these students by studying in America, learning about us, about our ways of doing business as well as the integrity, carry these values back to their countries. If they head back; many don't. They stay in the United States, but a good many do

head back. Leadership that in terms of our public diplomacy is very important.

We constantly worry about the educational system, about al Qaeda people getting particular religious training without any grounding at least in things that we believe are fundamentally important here. And so the question is if we were to exclude all of these people, sort of cancel the visas of 5,000 people and say we're going to keep it to ourselves, we could.

But on the other hand, the benefits that come from having tens of thousands of these students in our country, I suppose it becomes a problem for you at State, with regard to immigration service, others quite apart from the FBI and counterintelligence to work this problem. So we have the benefits really of people understanding America and hopefully cut the liabilities of persons who have bad designs.

Mr. FORD. I would agree that the loss of the opportunity to go to the University of North Carolina or Duke or North Carolina State or other universities, North Carolina or Indiana or Purdue would be their loss. But my sense is that even if we tried to keep people away, which I think is totally undemocratic and against whatever our whole country stands for, but even if we did, this information is too portable that they might not get the best that they would if they went to North Carolina and to Indiana, but they get enough by staying at home from other sources.

Senator LUGAR. And long range learning on the Internet perhaps.

Mr. FORD. That's right. And I've always, you know, I may be naive, but I think that if they come here to the United States and study that they not only will learn science, but they'll also learn a little bit about our democracy and our freedom and maybe carry that back with them to wherever they're from.

So obviously there's a risk there, but I've always felt like the risk was that to close down our society and go against our instincts here for freedom and education for everybody.

Senator LUGAR. Just one more follow-up. Now, looking at it the other way, a long time ago when Vice President Gore was meeting with Russian Prime Minister the Chernomyrdin, I suggested that one potential solution for the chemical and biological problem in Russia was for American firms to buy the facilities. Literally, the scientists want to be employed. There is a tremendous amount of communication back and forth all the time. I still think that's a good idea.

Investors face alot of problems, including the legal system of Russia, lack of protection for stockholder rights, all that is nightmare for American firms. But if there is to be some degree of constructive movement in these areas it would come, it seems, through international cooperation with American management working with Russian scientists. We will need to clean up a lot of old facilities which should be torn down, safely store and secure bad stuff that should be terminated and this is a time in which the Russians might be receptive to this kind of cooperation.

So I don't ask you for a comment, but please carry back to State at least some impetus that this might be useful.

The CHAIRMAN. Thank you. Senator Frist.

Senator FRIST. Just one minute. First of all, thank you very much for again an outstanding presentation. This whole last colloquy on science and the exchange of intellectual capital I think does mean that our intelligence community needs to really focus a lot on science peer review, having our scientists sensitized to what the relative risks are to a nation and what you pick up as targeting.

That's in some ways tough for our scientists because they've never been brought into the room. And the same way we're bringing the CIA and the FBI into the room with public health officials for the first time looking at homeland security. First time if you have somebody from law enforcement sitting right next to a doctor sitting right next to epidemiologist, first time.

But that's what it's going to take and because science is going to continue to progress, we may have smallpox—we may be getting a good vaccine to smallpox, but with some genetic engineering and the science is there today, the smart terrorist can simply re-engineer an anthrax, botulinum toxin, plague, tularemia. They will be able to in the next few years and therefore this ongoing integration, openness, transparency, peer review of our scientific community with intelligence, I believe, is going to be critical.

The CHAIRMAN. Thank you very much. Carl, thanks again and within the next between now and probably just after the recess, I'm going to be asking for your help, the committee will, in closed session.

Mr. FORD. And I will bring some of my experts with me who actually know the answers to some of these questions.

The CHAIRMAN. You've done very well and you've framed this in a way that we have to be able to begin to get a handle on it and I thank you very, very much for your time.

Mr. FORD. Thank you, Mr. Chairman. Thank you.

The CHAIRMAN. Now we'll hear from a very distinguished panel. Michael Moodie, President of the Chemical and Biological Arms Control Institute; Dr. Amy Sands, Deputy Director of Center for Nonproliferation Studies in Monterey; and Dr. Alan P. Zelicoff, Senior Scientist, Sandia National Laboratory, Albuquerque, New Mexico.

We thank you all very, very much for your patience and for being here. This is to us a very, very important hearing. Maybe we can begin with your statements in the order in which you were called. Dr. Moodie, you first and if you wish to, I'm not suggesting you have to, if you summarize your statement, be sure the entire statement be placed on the record. This is important so you take the time you need to make the statement. You've come a long way to help us. Thank you.

STATEMENT OF MICHAEL MOODIE, PRESIDENT, CHEMICAL AND BIOLOGICAL ARMS CONTROL INSTITUTE

Mr. MOODIE. Thank you very much, Mr. Chairman. It's an honor to appear before the committee once again. I've got a rather long statement so I'll just take a few minutes to summarize it and appreciate——

The CHAIRMAN. Don't short circuit. This is important, so take your time.

Mr. MOODIE [continuing]. Yes, sir, but I'll hit the high points.

The CHAIRMAN. Okay.

Mr. MOODIE. Mr. Chairman, Members of the committee, for the last decade and especially since September 11th, Americans have been on a steep learning curve about chemical and biological weapons.

In the Gulf War, Saddam Hussein confronted us with a chemically and biologically armed opponent. Aum Shinrikyo's sarin gas attack in the Tokyo subway was a wake up call that showed our country's vulnerability to a kind of terrorism that could include unconventional weapons that produce high casualties. And the recent anthrax mailings and hoaxes have forced us all to learn more about biological weapons than most people ever wanted to know.

Among the mix of tools on which we must draw to deal with these challenges is arms control. This is not to argue that arms control must have pride of place among those tools. Indeed it may be that arms control is not the most important policy arena for dealing with chemical and biological weapons proliferation by states or their potential acquisition by terrorists. But arms control can make a contribution and it should not be eliminated from the policy toolbox.

In my statement, I consider some of the factors that are creating a more complex environment, driving the need for new approaches for dealing with the CBW challenge and redefining arms control's role in helping to meet that challenge. In my oral remarks this morning, I'd like to focus on meeting the challenges that will confront us as we attempt to move forward.

First, with respect to chemical weapons. The first challenge, as the last speaker said and as many Members of the committee have emphasized, is eliminating those chemical weapons that already exist. Although the destruction process in the United States is proceeding reasonably well, as has already been pointed out, its counterpart in Russia is far behind schedule. It is my view that it is doubtful in the extreme that Russia will meet the timetable specified in the Chemical Weapons Convention even if it is granted the one-time five year extension allowed by the treaty.

This predicament is first and foremost a problem for the Russians themselves. Moscow is clearly committed to making progress, but its financial commitments will not be sufficient to meet its treaty obligations. Ways must be found to promote a greater commitment from Russia itself. But those countries that have an interest in the destruction of the Russian CW stockpile, which is in essence every state party to the CWC, should also provide more assistance. Not only the United States, but in particular in my view, the Europeans and Japanese should do more.

The upcoming CWC review conference scheduled for next year should provide an opportunity for developing a support strategy to meet this goal, which in my view represents the single most important objective of the CWC.

Another issue that must be addressed relates to challenge inspections under the convention.

In many ways the challenge inspection provision is the single most important tool in the entire treaty. But to date, that provision has never been invoked, although suspicions have been raised that

some state's parties are in substantive violation of their commitments. The United States, for example, has claimed publicly for many years—both the Clinton and Bush Administrations—that Iran continues to violate the treaty, yet Washington has never followed up these allegations by requesting a challenge inspection in Iran.

In my view, the longer such provisions are not used, the more difficult it will become to use them in the future. And as a result, the international community could lose a critical tool for promoting the fundamental goals of chemical disarmament.

A third important issue that must be addressed is the adaptability of the convention to advances in chemical science and technology. Certain areas of chemistry and biology relevant to the CWC are changing rapidly and will continue to do so. In the area of toxins for example, advanced bio-technology can create novel toxins that have scientific or medical applications but that can also be misused as weapons.

A consideration should be given therefore to an ongoing process that provides updated information on critical scientific and technological developments to states parties of the convention on a sustained basis.

A further area of effort should focus on issues of cooperation and assistance. During the first five years of the implementation of the CWC, states parties and the Organization for the Prohibition of Chemical Weapons have attempted to view assistance issues as secondary to operational matters such as declarations and inspections. But the issue of international cooperation is important in light of the ongoing debate over the future of chemical export controls and of the Australia Group in particular.

As science and technology continues to advance and global technology diffusion proceeds, the question of the viability of our export control arrangements will become increasingly difficult to manage.

The final area which chemical arms control must address relates to the institutional context within which those arms control efforts proceed, particularly straightening out the problems of the Organization for the Prohibition of Chemical Weapons.

First, as the Chairman has all ready indicated, for some time the OPCW has been plagued with financial and staff problems that must be fixed. In some cases, the solutions rest in states parties fulfilling their obligations in a timely manner. But some of the budget problems are structural and will require the Organization to define new ways of doing business to set the situation right.

Second, many states parties cover activities at the organization with a junior diplomat from their bilateral embassy to the Netherlands. This generally low level of representation at the OPCW complicates and hampers the work of the Organization and makes it less efficient and effective.

Finally, questions of institutional leadership have arisen. It is clear that the OPCW leadership has lost the confidence of some of the key CWC states parties. Such a situation cannot be allowed to continue for very long as it creates an environment that is severely detrimental to staff morale and effective action.

If the OPCW is not lead in a manner that generates confidence among those countries whose support is critical, treaty implemen-

tation will suffer. The focus of attention will be on internal issues rather than on getting the job done—and the job is critical and should come first. Therefore a means for resolving the current dispute about leadership must be found.

Turning to the biological weapons challenge, five issues in particular must be addressed. The first question must be the goals of the next steps in arms controls. Two sets of possible objectives for steps suggest themselves. One set relates more to traditional arms control goals including verification, confidence building, increasing transparency or enhancing consultations. Of these, effective verification of the BWC is not possible and each of the other objectives has conceptual and practical political problems associated with them. And in my view none of them appears to be sufficiently robust to energize the currently stagnant process.

An alternative approach is to go beyond traditional arms control goals to define the aims altogether differently. In light of the complex environment with which biological arms control must deal, as well as the clear lack of success of traditional approaches, the need for new thinking is clear. In particular—and this may be my most important point today—the effort must be made to create a new conceptual and policy environment within which the current BW challenges can be addressed. Such a new environment would need a move away from business as usual by all of the critical stakeholders including governments, industry, the scientific community, the health community and many others.

New partnerships among these key constituencies must be developed. New means must be identified to address the speed of scientific and technological change. This raises questions about the value of and potential for governance or self-governance of the international biological, scientific and technological communities.

Second, U.S. officials have stressed that too little attention has been paid to questions of noncompliance. Given this clear U.S. priority, any next steps must address two core concerns from Washington's perspective. First, how do BWC states parties meet the essential but often ignored responsibility of dealing with countries who are party to the treaty, but are either cheating or suspected of doing so. Second, how do they deal with those countries who are not states parties and therefore not breaking any commitments, but are clearly violating a widely held global norm?

These are not questions that members of the international community necessarily are comfortable addressing. They would prefer to assume that states that join a convention comply with their obligations. The reality, however, is that states cheat and something must be done about them.

Third, part of the reason that the BWC protocol negotiations did not focus on core proliferation concerns is that the drafters bent over backwards to meet the political requirements of some participants that any multilateral agreement treat all states parties the same. This political objective has been a hallmark of non-aligned nations' positions in arms control negotiations since the nuclear nonproliferation treaty created nuclear haves and have nots.

This nondiscrimination may be politically essential, but it does not necessarily create good arms control in a situation in which participants are not equal in terms of their interests, assets or obli-

gations. If progress is to be made, somehow these imperatives have to be reconciled.

Fourth, cooperation and assistance in the life sciences for peaceful purposes is a political imperative of non-aligned countries that they insist must be included in any nonproliferation agreement. Some BWC states parties have made no secret of the fact that they joined the treaty not because of their concerns over biological weapons, but in order to secure access to critical science and technology.

Conventional wisdom holds that no multilateral progress will be made on harder-edged nonproliferation measures without something on cooperation and assistance. If this is the case, any next steps must find a way to reconcile these strongly held interests. The conventional wisdom should also be challenged and consideration of next steps should also explore whether potential hard arms control and cooperation and assistance measures might be addressed on separate tracks.

Finally, following the failure of the Ad Hoc Group negotiations and the suspended review conference, some participants might want to abandon arms control altogether and rely on other measures to fight BW proliferation and biological terrorism. Even if arms control is included in the toolkit for promoting nonproliferation and counterterrorism, the priority it assumes in relation to other available tools will be a critical factor in assessing how assertively and successfully one might promote next steps in arms control.

In fact, differences have all ready emerged between the United States and other countries including friends and allies over these relative priorities. The United States tends to assess the value of arms control and the contribution of instruments such as the BWC in terms that relate them to other tools in the toolkit including intelligence, diplomacy, passive and active defenses, military options and export controls. Arms control is appreciated for its contributions, but its limitations are also recognized and maximizing its potential is seen to derive from making it work together effectively with these other policy tools.

In contrast, and to overstate for emphasis, some Europeans for example, tend to give pride of place in the toolkit to arms control. Some even view arms control as an alternative to these other policy tools rather than as a complement to them. The result is that some friends and allies of the United States rely more heavily on the contribution of arms control in dealing with the problems of proliferation than does Washington. Such differences must be explored in an assessment of the potential utility and effectiveness of any next steps in BW arms control.

Mr. Chairman, in my statement I have concluded with a number of specific suggestions that I think might help meet these requirements. I would be happy to go into those in more detail during the question period. Thank you very much.

[The prepared statement of Mr. Moodie follows:]

PREPARED STATEMENT OF MICHAEL MOODIE

REDUCING THE CHEMICAL AND BIOLOGICAL WEAPONS THREAT:
WHAT CONTRIBUTION FROM ARMS CONTROL?

On July 25, 2001 the United States announced that it would not support the draft protocol negotiated by the Ad Hoc Group (AHG) of states parties to the Biological Weapons Convention (BWC) as presented in the "composite text" offered by the AHG Chairman. The U.S. statement made clear that further negotiation of specific language in the draft would not address the major problems the United States had with the proposed protocol, which was seen as based on a fundamentally flawed conceptual approach and unwarranted assumptions.

Five months later, the Fifth BWC Review Conference suspended its efforts without completing a Final Declaration in light of a demand by the United States that the Ad Hoc Group process be brought to an end. This last-minute standoff was the culmination of three weeks of disputes over how best to strengthen the BWC and to carry forward the fight against biological weapons (BW) proliferation.

Between these two events, the United States was the victim of unprecedented anthrax attacks in the wake of the September 11 destruction of the World Trade Center. The anthrax attacks transformed what had been a theoretical concern for some people into a very real security threat for the entire country.

While much of our recent attention has focused on biological weapons, concern about chemical weapons should be no less intense. We have seen chemical weapons used—both by states and by terrorists. Saddam Hussein's chemical attacks against both Iranian forces and his own people introduced this generation to the horrors of such weapons. The Aum Shinrikyo's use of sarin nerve gas in the Tokyo subway in March 1995 served as a wake-up call to the United States, combining with the bombing of the Murrah Federal Building in Oklahoma City to drive home the realization to policy makers and public alike that the United States was not immune from terrorism, that weapons of mass destruction could be involved, and, perhaps most importantly, that we were not prepared.

Today, administration witnesses report that perhaps as many as two-dozen countries are pursuing chemical weapons capabilities. A significant number are also seeking biological weapons. The pursuit of chemical and biological weapons capabilities by terrorist groups such as al Qaida has been well documented in court proceedings as well as in the media.

Among the difficult lessons we have had to learn about chemical and biological weapons is that they are not the same, and addressing the challenges they pose—whether in terms of proliferation or terrorism—will require a different mix of policy responses.

Among the mix of tools that must be applied in both cases, however, must be arms control. This is not to argue that arms control must have pride of place among those tools; indeed, it may be that arms control is not the most important policy arena for dealing with either chemical and biological weapons proliferation by states or their potential acquisition by terrorists. But arms control can make a contribution, and it should not be eliminated from the policy toolbox.

3If arms control is to make an effective contribution to the CBW challenges, however, policy makers must have an appreciation of the changes in the environment that will shape its application. In particular, a number of factors are driving a need for new thinking.

The Convergence of States and Terrorists

Before the events of September 11 and the subsequent anthrax attacks, analysts tended to conceptualize and address the state proliferation challenge and the problem of terrorism along separate tracks. This split approach prompted a focus on different strategies and different policy tools for dealing with what were considered distinct aspects of the problem, if not separate problems altogether. Arms control, for example, was deemed to be targeted against state proliferation and not designed to address the terrorist threat.

Such a separate approach in the world after September 11, however, will no longer suffice. The distinction between proliferation and terrorism and between terrorists and the state has become difficult to draw. As a result, the United States and the international community more broadly must implement a response to the chemical and biological weapons challenge that deals with state proliferation and bioterrorism as different aspects of the same problem. This will require an approach that is strategic in nature, multifaceted in action, and which exploits a range of tools.

Arms control is important in this context, but the combination of politics, science and technology, and treaty language that surrounds both the Chemical Weapons

Convention and, especially, the Biological Weapons Convention ensures that these conventions will be insufficient on their own. Nor does an emphasis on arms control alone provide a sufficiently wide perspective to facilitate all of the varied actions that will be required by all of the necessary actors—from both the public and private sectors—to deal effectively with the now realities that the convergence of state and non-state challenges present. What is needed is an approach that goes beyond the traditional modalities of arms control to new ways of thinking about how to strengthen the conventions and the norms against biological and chemical weapons that they embody.

Advancing Science and Technology

Chemistry and biology and their associated technologies have witnessed incredibly rapid advances in recent years, and, if anything, the pace of change is likely to accelerate. Rapid changes in biotechnology in particular in the next several years will shape new scientific and business methods and practices far removed from those of today. Moreover, many of the breakthroughs in the relevant sciences and technologies are likely to be promoted by combining them with other technologies—for example, nanotechnology, cutting-edge information technologies, and new materials science. Creative scientists and technologists could find new ways of putting such things together to advance their CBW capabilities. In essence, advancing science and technology will allow future proliferators—whether governments or terrorists—to enter the chemical and biological weapons game with a greater scientific and technological base on which to build their efforts.

Classic arms control will have difficulty in capturing this dynamism. Government bureaucracies are notoriously slow to adapt. International organizations are no less so. The vastly different rates at which science will move forward and governments can adapt, require a broader approach that facilitates an ongoing appreciation of the evolving scientific and technological landscape in as close to real-time as possible.

Engaging Industry More Productively

In areas associated with commercial activities based on the life sciences in particular, those involved emphasize the vast contributions their rapidly advancing scientific and industrial capability is making to the improved quality of life for many people. Not everyone shares the view, however, of advancing life sciences in a commercial context as an unalloyed good. Unscrupulous drug companies or other biotechnology enterprises, for example, have recently been portrayed as villains in popular novels and movies. The fact that advanced biotechnology is given a dark dimension in the popular culture captures a sentiment among the public that, at the very least, reflects uncertainty and uneasiness about industry dealing with issues generated by the advancing life sciences and related technology.

Representatives from U.S. biotechnology and pharmaceutical industries could argue that they participated extensively in the BWC protocol negotiating process, at least insofar as they interacted with government representatives engaged in the negotiations. Some characterizations of industry involvement, however, suggest that it was industry opposition that influenced the Bush administration's decision not to support the draft protocol. While such a characterization is not entirely accurate, industry certainly preferred a minimalist approach in the protocol that would have created the least demanding obligations possible. It is also fair to say that industry often did not display an overly cooperative attitude.

Looking to the future, there is little to suggest that industry would change its approach if another protocol-style effort were put forward as the means by which to pursue biological arms control. Something different is needed, and governments must do better with industry. As the drivers of much of the critical science and technology, industry must be made to understand its stakes in the challenge and be fully integrated into the necessary strategic response. Given the growing public and governmental concerns over developments in biotechnology, it would also be very much in the interests of the biotechnology industry to cooperate in promoting proper, safe, and ethical practices around the world.

The Way Forward

In responding to this environment, the arms control contributions to addressing the chemical and biological weapons challenges begin from different starting points and are likely to take different courses.

Challenges to Chemical Arms Control

The first challenge in eliminating the scourge of chemical weapons is to destroy those weapons that already exist. Although the destruction process in the United States is proceeding reasonably well, its counterpart in Russia is far behind schedule. It is doubtful in the extreme that Russia will meet the timetable specified in

the CWC, even if it is granted the one-time, five-year extension allowed by the convention.

This predicament is first and foremost a problem for the Russians themselves. Moscow is clearly committed to making progress, but its reported financial commitments will not be sufficient to meet its treaty obligations. Ways must be found to promote a greater commitment from Russia itself. Beyond promoting greater Russian expenditures, however, those countries that have an interest in the destruction of the Russian CW stockpile—which is, in essence, every state party to the CWC—should provide more assistance. In particular, the Europeans and Japanese should do more. The CWC Review Conference scheduled for next year should provide an opportunity for developing a support strategy to meet this challenge, which represents the single most important objective of the CWC.

Moscow is not likely to be the only target of criticism during the Review Conference, however. Washington will come in for its share of censure as well, particularly for the three unilateral exemptions included in the U.S. implementing legislation. Prior to the Review Conference, therefore, the administration should assess the impact of these provisions on CWC implementation, including their effects on the general political environment. This assessment would then provide the context for judging whether the potential benefits of retaining them outweigh the costs. Based on that assessment, the administration could convey to the Review Conference that whatever problems have been created for the convention by this legislation will be addressed.

A third set of issues that must be addressed relates to challenge inspections under the CWC. In many ways, the challenge inspection provision is the single most important tool in the entire convention. To date, however, that provision has never been invoked, although suspicions have been raised that some states parties are in substantive violation of their commitments. The United States, for example, claims publicly that Iran continues to violate the treaty, yet Washington has never followed up these allegations by requesting a challenge inspection in Iran.

The longer such provisions are not used, the more difficult it will become to do so. As a result, the international community could lose a critical tool for promoting the fundamental goals of the CWC.

A fourth important issue that must be addressed is the adaptability of the CWC to advances in chemical science and technology. As noted, certain areas of chemistry and biology relevant to the CWC are changing rapidly and will continue to do so. In the area of toxins, for example, advanced biotechnology can create novel toxins that have scientific or medical applications but can also be misused as weapons.

The CWC's Scientific Advisory Board is engaged in a process with the U.S. National Academy of Science to examine the critical areas of scientific advance that warrant attention from CWC states parties. Their work will represent an important input into the forthcoming Review Conference. Consideration should be given, however, to an ongoing process that provides updated information on this critical issue to states parties on a sustained basis.

A fifth area of effort should focus on issues of cooperation and assistance. During the first five years of CWC implementation, states parties and the OPCW have tended to view assistance issues as secondary to operational matters such as declarations and inspections. Because the assistance provisions of the CWC have important political implications, however, they should not be ignored. The Review Conference provides a good opportunity to demonstrate interest in making tangible progress in this area.

The issue of international cooperation is important in light of the ongoing debate over the future of chemical export controls. The Australia Group (AG) has been a particular target for some non-aligned countries that find it to be discriminatory and inconsistent with the spirit if not the letter of the convention. Australia Group members respond that as long as they have the right to make their own judgments as to which countries are in compliance with the treaty, they also have the right and the obligation to determine to whom they will export relevant chemical and equipment and how they will make and implement those decisions.

As science and technology continues to advance and global technology diffusion proceeds, this question will become increasingly difficult to manage. While export controls continue to make a contribution, the fact that they only buy time to help other tools of policy to work raises the question of how much time and effort should be put into preserving them.

The final area which chemical arms control must address relates to the institutional context within which those arms control efforts proceed, particularly straightening out problems with the Organization for the Prohibition of Chemical Weapons (OPCW). For some time, the OPCW has been plagued with financial and staff problems that must be fixed. In some cases, the solutions rest in the states parties ful-

filling their obligations in a timely matter. But some of the budget problems are structural and will require the organization to define new ways of doing business to set the situation right. On staffing questions the OPCW already has a reputation of being overly sensitive to "pay and promotion" matters such as its salary scale relative to other international organizations.

A second set of issues relate to national representation to the OPCW. Many states parties cover activities at the organization with a junior diplomat from their bilateral embassy to The Netherlands. Such officials often lack the technical capability and political authority to make decisions or even effective interventions. Although important decisions are matters for national capitals, the current generally low level of representation at the OPCW complicates and hampers the work of the organization and makes it less efficient and effective.

Finally, questions of institutional leadership have arisen. It is clear that the OPCW leadership has lost the confidence of some of the key CWC players. Such a situation cannot be allowed to continue for very long as it creates an environment that is severely detrimental to staff morale and effective action. If the OPCW is not led in a manner that generates confidence among those countries whose support is critical, treaty implementation will suffer. The focus of attention will be on internal issues rather than on getting the job done. And the job is critical and should come first. A means for resolving the current dispute must be found.

Challenges to Biological Arms Control

If the international community is to use arms control effectively in addressing biological weapons proliferation and bioterrorism, it must address the political problems that plagued past biological arms control efforts, including the Ad Hoc Group's attempt to negotiate a legally binding protocol to the BWC. Five issues, in particular, must be addressed.

The first question must be the goals of the next arms control steps. Obviously, the more robust the goals, the more challenging they will be to implement successfully. The goal clearly cannot be BWC "verification." Even Ad Hoc Group members accepted the fact that the BWC cannot be verified under current circumstances. The AHG goal, therefore, became defining measures that contributed to "enhancing confidence in compliance." They ultimately fell short of that goal as well, indicating how difficult real progress in biological arms control is.

Two sets of possible objectives for next steps suggest themselves. One relates to more "traditional" arms control-related goals, including confidence building, increasing transparency, or enhancing consultations. Each of these objectives has conceptual and practical political problems associated with them. None of them appears to be sufficiently robust to energize the currently stagnant process.

An alternative approach is to go beyond traditional arms control goals to define the aims altogether differently. To some extent this was the goal of the Bush administration when it offered its package of alternative measures at the Fifth Review Conference. In light of the complex environment with which biological arms control must deal, as well as the clear lack of success of traditional approaches, the need for new thinking is clear. In particular, consideration must be given to creating a new conceptual and policy environment within which current challenges can be addressed. Such a new environment would mean a move away from "business as usual" by all of the critical stakeholders, including governments, industry, and the scientific community. New partnerships among these key constituencies must be developed. New means must be identified to address the speed of change and integrate its most important aspects. This raises questions related to the appropriate contributions of each of the key stakeholders, including questions about the value of and potential for governance or self-governance of the international biological scientific and technological communities.

Second, part of Washington's problem with the draft protocol was that it proposed expending considerable resources on activities not clearly or directly associated with core proliferation concerns. In announcing its rejection of the draft protocol, in its statement at the Fifth Review Conference, and in discussions after the Conference was suspended, for example, U.S. officials stressed that too little attention has been paid to questions of non-compliance. Given this clear U.S. priority, any next steps must address two core concerns that, from Washington's perspective, the protocol did not highlight: First, how do BWC states parties meet the critical, but often ignored responsibility of dealing with countries who are party to the treaty but are either cheating or suspected of doing so? Second, how do they deal with those countries who are not states parties and therefore are not breaking any commitments but are clearly violating a widely held norm? These are not questions that members of the international community necessarily are comfortable addressing. They would prefer to assume that states that join a convention would comply with its obliga-

tions. The reality, however, is that states cheat, and whatever is done in the arms control arena must provide some attention to what to do about those states that do.

Third, while its currency is military power, arms control is at its core a political activity, and any successful next steps in the biological field cannot ignore the political stakes to which some participants in the process give high priority. Part of the reason the protocol did not focus on core proliferation concerns is that the drafters bent over backwards to meet the political requirement of some participants that any multilateral agreement treat all states parties the same. This political objective has been a hallmark of nonaligned nations' positions in arms control negotiations since the NPT created nuclear "haves" and "have nots." Non-aligned states in particular have used the "rules of the game," particularly the requirement that any agreement must be done by consensus, to insist on meeting this political sine qua non.

Non-discrimination may be politically essential but it does not necessarily create good arms control in a situation in which participants are not equal in terms of their interests, assets, or obligations. Moreover, the Bush administration has made it clear that the protocol negotiations and, to some extent, the Review Conference were conducted in a framework that, if not discredited, must now be set aside. Will other participants agree since a new "game" may deprive them of some critical leverage for achieving key political goals? If progress is to be made, these imperatives must be reconciled. But can they, and, if so, how?

Fourth, cooperation and assistance in the life sciences for peaceful purposes is a political imperative of non-aligned countries that they insist must be included in any nonproliferation agreement. Some Ad Hoc Group participants made no secret of the fact that they were involved not because of their concerns over biological weapons but in order to secure new means of access to critical science and technology. In the minds of some people, therefore, the packaging of compliance measures and cooperation and assistance provisions in the protocol distracted from the main objective of the protocol and the BWC itself and created potential for confusion and competition among priorities.

Conventional wisdom holds that no multilateral progress will be made on harder-edged proliferation measures without something on cooperation and assistance as well. If this is the case, any next steps must find a way to reconcile these strongly held interests. But conventional wisdom should also be challenged, and consideration of next steps should also explore whether potential "hard arms control" and cooperation and assistance measures might be addressed on separate tracks.

Finally, following the failure of the Ad Hoc Group negotiations and the suspended Review Conference, some participants might want to abandon arms control altogether and rely on other measures to fight BW proliferation and biological terrorism. Even if arms control is included in the tool kit for promoting BW nonproliferation and bioterrorism, the priority it assumes in relation to other available tools will be a critical factor in assessing how assertively and successfully one might promote next steps in arms control.

In fact, differences have already emerged between the United States and other countries, including friends and allies, over these relative priorities. The United States, for example, tends to assess the value of arms control and the contribution of instruments such as the BWC in terms that relate them to other tools in the tool kit, including intelligence, diplomacy, passive and active defenses, military options, and export controls. Arms control is appreciated for its contribution, but its limitations are also recognized, and maximizing its potential is seen to derive from making it work together effectively with other policy tools. In contrast (and to overstate for emphasis), some Europeans tend to give pride of place in the tool kit to arms control. Some even view arms control as an alternative to these other policy tools rather than as a complement to them. The result is that some friends and allies of the United States rely more heavily on the contribution of arms control in dealing with the problem of proliferation than does Washington. Such differences must be explored in an assessment of the potential utility and effectiveness of next steps in BW arms control.

Additional Measures

The United States made it clear that it does not view the package of measures it proposed at the Fifth Review Conference as a comprehensive list of potentially valuable and negotiable measures. Indeed, it should not. The U.S. proposals, supplemented by good ideas that emerged through consultations with close friends and allies, form the basis for moving forward, but more could be done. The following ideas are offered as a contribution to thinking about further measures that might be considered.

Strengthening the Ability to Confront the State/Terrorist Convergence

The fact that the terrorist and state proliferation threats have converged requires that the BWC be considered in light of what further it might be able to contribute to the problem as a whole. The proposal for domestic legislation that criminalizes BWC-prohibited activity is one such measure that could be applied to both dimensions of the challenge. Mother possibility, one that also serves the Article X requirement for states parties to promote cooperation and assistance, might focus on international collaboration on biological terrorist issues. Such collaboration might be as limited as sharing information on lessons learned from exercises. Additionally, it might extend to direct cooperation in which those states parties that have done more in the area of biological terrorism preparedness and response assist other states parties whose capabilities in those areas are more limited.

Such collaboration would have to be done on a voluntary basis. There are obviously areas related to counter-terrorism, including preparedness efforts, that are highly sensitive and for which sharing with others would not be appropriate. But the events of September 11 should have led all states parties to recognize that anyone could be the object of biological terrorism and that the threat extends to everyone. In such a situation, one could assume that some states parties will be looking for help in addressing that threat. Providing assistance under Article X of the BWC would be one means of meeting their needs.

A second possible measure that could be explored for its value in addressing the convergence of state BW proliferation and bioterrorism relates to investigations. The proposed U.S. package included a proposal for a mechanism to investigate suspicious outbreaks of disease or alleged biological weapons use. The prospect of developing a mechanism for investigating facilities that may be suspected of conducting activities prohibited by the convention should also be considered. While this is certain to be a controversial suggestion, including within the U.S. government, the possibility of a limited measure to this effect should be explored.

The historical example of the Sverdlovsk anthrax outbreak suggests some of the reasons why. Even if the additional measures the United States proposed had been in place in 1979, they would have afforded only the opportunity for the investigation to go to the gates of the facility that was thought to be the source of the release. No mechanism would exist for allowing access to the facility. Without such access, the result of any investigation at Sverdlovsk would still have been unanswered questions, continuing allegations and denials, and, in political terms, insufficient grounds for mobilizing an international response to a potentially serious treaty violation. This could also be the result of investigations conducted under the new U.S. proposals if there is no ability to get inside suspect facilities.

The proposal offered here is analogous to the challenge inspection provision of the CWC, an extraordinary measure that would be used only when strong evidence exists of a serious violation. It is not in any way an endorsement of the elaborate, and unhelpful, facility declaration and visits system detailed in the draft protocol. Rather, what is needed is a more limited, stand-alone capability that would allow some means for seeing what is going on inside facilities about which serious suspicions have been raised. The measure is offered in the full realization that even getting inside a facility will not necessarily yield a smoking gun.

It may be that the techniques are not yet available to allow for a meaningful facility investigation that can also protect unrelated national security or proprietary business information. Certainly, there was considerable debate during the protocol negotiations over differing interpretations of the results of various on-site trial activities. It would be unfortunate, however, if consideration of the possibility of doing facility investigations stopped completely because it was deemed "too hard" or "too dangerous." One need not commit now to the realization of such a measure, but as monitoring technology continues to evolve, including technology based on advancing life sciences, exploring further what procedures might be helpful could prove to be a worthwhile effort.

Coming to Grips with Advancing Science and Technology

In its proposal package, the United States called for better oversight of genetic engineering on the grounds that certain experiments involving the cutting and splicing of genetic material could have dramatic and unexpected consequences with relevance for biological weapons. However, it is not just genetic manipulation that creates potential and unexpected risks, but the combination of better understanding of life at the molecular level with other scientific advances, including nanotechnology, materials science, and bioinformatics. BWC states parties might consider, therefore, whether there is anything in these combinations of scientific activities that could also create sufficient risks to warrant greater oversight and reporting. BWC states parties, therefore, could convene a working group of scientific experts charged with

identifying combinations of scientific activity that could create serious potential threats. The panel could also elaborate what kind of national oversight of such activities would be appropriate.

A further dimension of advancing life sciences and technology that will have important implications for the evolution of the biological weapons threat is their growing global dissemination. Indeed, the way in which science and technology is developed, produced. and disseminated on a global basis has changed significantly in the years since the BWC entered into force. Much of the material is dual use; the private sector is responsible for most of the advances; knowledge and capability will only become increasingly dispersed around the world as biology and biotechnology are applied to more aspects of life.

States parties to the BWC should try in general to identify ways to ensure that this global diffusion of science and technology does not result in a more serious BW threat and, in particular, to ascertain ways to bolster Article m of the BWC which prohibits transfers of biological weapons and related-materials. The draft protocol included a provision that created a consultation mechanism whereby one state's concern that an unauthorized, inappropriate, or prohibited transfer has occurred could be raised with the state party that made the transfer. Although it is an excellent idea, such a provision would have no chance of being adopted in light of the contentious dispute about export controls that plagued the Ad Hoc Group negotiations.

The continuing debate, however, may provide an opportunity for an evaluation of longterm management of the diffusion of biological-related science and technology. This is not a call to abandon the Australia Group whose activities will remain important for the foreseeable future. Rather, it is a plea to recognize that the new environment within which the biological weapons problem must be addressed will include a rapidly changing scientific and technological global landscape.

Fostering Better Appreciation of the Need for a New Conceptual and Policy Environment

The confidence building measures (CBMs) agreed at the 1986 and 1991 Review Conferences will remain on the books. These voluntary measures ask states parties to provide information regarding biological-related activities, including past offensive BW programs, current biological defense activities and facilities at which that work is being conducted, unusual outbreaks of disease (to be reported to the World Health Organization), and facilities involved in human vaccine production, among others. It might be helpful for BWC states parties to take another look at the CBMs to determine whether they can contribute to the creation of the new broader conceptual and political approach discussed earlier, either in their current or in an adapted form.

Some people might argue that any attempt to return to the CBMs would be a waste of time. Because the measures are deemed politically rather than legally binding, only a relatively small number of countries provided the information called for in the CBMs even once, let alone annually. Although the number of states parties participating in the CBMs steadily increased, the generally poor performance suggests that, left to their own devices, states parties are unlikely to participate more than they have in the past.

The point, of course, is that states parties should not be left to their own devices. Some of the CBMs could be replaced by elements of the new U.S. proposal. But other CBMs will remain as part of the BWC regime, and they should not just be abandoned. Rather, they should be considered for what they might contribute to the new conceptual framework. If they are deemed to be of some value, they should not be dropped.

The CHAIRMAN. Thank you very much.

Dr. Sands.

STATEMENT OF AMY SANDS, PH.D., DEPUTY DIRECTOR, CENTER FOR NONPROLIFERATION STUDIES, MONTEREY INSTITUTE OF INTERNATIONAL STUDIES

Dr. SANDS. Mr. Chairman and distinguished Members of the committee, let me just thank you for the opportunity to appear before you this morning to examine a topic while extensively discussed deserves, I believe, continued discussion and a new look.

In my comments today, I plan to focus only on the changed nature of today's world, trying to take a look at some of the assump-

tions that we should be wary of, especially as they relate to the chemical and biological threat and then look at a few recommendations I'd like to make. In my written testimony, I have provided much more detail on the chemical and biological threat, giving specific examples of some state and terrorist aspects.

Several factors have come together today to increase the likelihood of CBW acquisition and use by states and subnational groups. First, states and terrorists may see CBW as giving them a new advantage. They know that we are incredibly worried about such a possibility and may believe such an attack will not only kill many Americans, but also could psychologically freeze the United States.

Second, it has now become apparent that certain thresholds have been passed. Our speculation of whether terrorists would and could kill thousands of people has been answered.

Third, chem-bio materials are available and there is clear evidence of terrorists being interested and capable of obtaining these materials. The supply-demand dynamic definitely favors terrorists.

Fourth, as September 11th events demonstrated, some terrorist groups exist that are clearly capable of organizing and operationalizing the type of complex, long-term effort that would be needed to develop and effectively deliver CBW agents.

Finally, as has been commented already earlier today, the technical workforce needed to develop effective CBW is available and you might call them cheap. In the former Soviet Union, hundreds perhaps thousands of scientists, engineers and technicians were fired or had their wages cut after the Soviet Union's collapse and President Yeltsin discontinued the BW program.

It is likely that a substantial number of scientists and engineers with expertise in the biological and chemical weapons area are disgruntled and frustrated. But the concern about clandestine recruitment of scientists should also include other states, such as South Africa and the former Yugoslavia, both of whom have discontinued CBW programs.

So it is not surprising given these factors, specifically the increased access to materials, targets, expertise and technology that we are now much more concerned about CBW actually being used by states or substate actors. Against this backdrop, though, I'd like to just take a look at certain assumptions that we have tended to make when thinking about this threat.

The first assumption, terrorists don't have physical locations to make or store CBW materials. It is often argued that terrorists may have safe havens, but still lack a physical infrastructure to develop CBW. However, an overlooked point is that terrorist groups can and have actually possessed recognizable and targetable CBW facilities. Examples include, the Al-Shifa pharmaceutical plant in Sudan which according to the Unites States government was really not a pharmaceutical plant, but a chemical weapons manufacturing complex that was engaged in the production of nerve agent VX.

Second, I think it is well known that Aum Shinrikyo had a compound in Japan that they used for much of their activities and a farm in Australia.

Third, a group called the World Islamic Fund Against Jews and Crusaders which was founded by bin Ladin managed to buy up a

set of facilities in the former Yugoslavia that had been used for chemical and biological weapons.

So as you can see from these cases, terrorists have had access to or possession of facilities. Some of these may even be located outside the safe havens they have and may appear legitimate, making the task of detecting and identifying them accurately much more difficult.

A second assumption. A certain set of chemical and biological agents such as VX, sarin, anthrax and smallpox are usually considered the most likely CBW agents to be used. This way of thinking may cause us to miss the obvious. Cyanide for example, is a chemical that has sometimes been overlooked as a weapon in favor of the more lethal and glamorous chemical agents like sarin and VX, yet the availability of various cyanide containing compounds which are used widely in industrial processes, make cyanide one of the more likely CBW agents to be used.

The WMD terrorism database at the Center for Nonproliferation Studies at the Monterey Institute records 52 possessions, plots or uses involving cyanide by terrorists. These cases have, so far, collectively resulted in only 124 injuries and 13 fatalities. But the danger lies more in the intent of the perpetrators than the results.

My written testimony lists some of the other examples, but today I'd just like to focus on two specific issues. One is the most recent case in Chicago that happened in early March where a man was found to be storing significant amounts of potassium and sodium cyanide in subway tunnels. It highlights the ease with which even a lone individual can acquire this poison.

And another example that happened in February 2002, with the arrest in Rome of nine Moroccans with potential links to al Qaeda for allegedly planning to poison the water supply of the U.S. embassy using potassium cyanide. It shows that the interest in cyanide is hardly waning.

A third assumption and one that we've already talked about a little earlier today is that states won't provide terrorists with chemical and biological weapons. Many of the states we believe to have chemical and biological programs also have been linked to numerous terror organizations providing them with a wide variety of assistance. Even though there has been little evidence to indicate that any of these states have transferred CBW material, technology or know-how to such terrorist organizations, the possibility cannot be ruled out.

But even if a state may not be willing to transfer CBW related technologies to a subnational actor, one cannot discount the possibility of rogue elements within a government or disgruntled or underpaid scientists or individuals sympathetic to terrorist causes that may be willing to illicitly transfer CBW related technologies and know-how to such terrorist groups.

A fourth assumption. Terrorists won't use CBW except in extreme cases. Nonstate players, especially terrorists, do not act under the same restraints as sovereign states. It is possible that these organizations do not perceive the WMD threshold the same way we do. Moreover, their assessment of the costs and benefits of using CBW may not be necessarily measured on the same scale as

that of nations and their concept of "extreme" may differ considerably from ours.

In fact if the motivation of an organization is to infuse terror, then the use of CBW, even on a small scale, might be seen as furthering their cause. In addition, the disparity between state and terrorist groups such as that between Israel and Palestinian forces may create a terrifying inequality that could lead to the use of CBW in an effort to rebalance the scales. This exact thought was expressed in a Palestinian weekly, which called for a Palestinian weapon of deterrence using chemical and biological agents that would create a balance of horror in the Palestinian and Israeli conflict.

So we should occasionally do a reality check and make sure our assumptions are still valid. Now I would like to spend a few minutes on some recommendations to try to address some of these concerns.

A general comment. What is required is innovative thinking and a reconceptualization of threats in the 21st century. It requires a long-term dedication to a multi-dimensional and multi-faceted approach that seeks to prevent WMD acquisition and use, to strengthen anti-proliferation norms, to develop adequate defenses here and elsewhere and to prepare for effective consequent mitigation and management in the advent of a WMD attack.

Specifically what are some of the activities that might need to be pursued? There are six areas that I outline in my written testimony as being critical for the United States if it is going to be successful in its war on terrorism and WMD proliferation. Let me mention all six, but I'm only going to talk to three of them.

The six are, first of all, enhancing global WMD materials protection, control and accounting. Secondly, supporting displaced WMD scientists and technical experts to keep them employed doing constructive socially beneficial projects. Third, enhancing intelligence collection, analysis, coordination and cooperation. Fourth, strengthening the public health sector within the United States and internationally. Fifth, renewing the international commitment to effective implementation of both the CWC and BWC. And sixth, making meaningful investments to address underlying causes of terrorism such as poverty, illiteracy and socioeconomic inequities.

As I said earlier, I plan to only talk to three of these recommendations at this point. The first one I wanted to address is enhancing global WMD materials protection, control and accounting. It is clear that the United States must continue its support of improved MPC&A procedures in the former Soviet Union, but it also must expand these activities to include sensitive, chem-bio materials and it must make them all international in scope.

Specifically though, in evaluating the security and protection globally of dangerous biological materials, it's quite apparent that without much trouble terrorists could easily steal or buy them illicitly. The United States and its allies must make it a priority to fill the security gap by pursuing vigorously enhanced national regulations that control and secure deadly pathogens and toxins and by launching the negotiation of a new bio-security convention.

Such a convention would complement the BWC by developing a set of specific concrete regulations and activities that guarantee the

control, accounting, safety and security of dangerous pathogens and toxins. I've attached a paper that's going to be published in the next issue of the Bulletin of Atomic Scientists that I've written with two of my colleagues from the Center for Nonproliferation Studies in which we go into much greater detail about this specific idea of the bio-security convention.

To initiate such a process, the United States should work with Europe, Japan and other like-minded states to develop the national legislation needed to prevent misuse and unauthorized access to dangerous biological agents and toxins. Using these efforts as models, the U.S. must lead the effort on an international level and with industry and academia to define international standards of safety and security in the bio-technology sector so that we will have more control over where the materials of concern are, who has access to them, how they are controlled and how they are stored and transferred.

A second recommendation is that we strengthen the public health sector within the United States and internationally. We need, obviously it's been said already today, to improve our own public health sector, but we also need to work with other international groups and foreign governments to the same internationally.

The proposed draft legislation of Senator Biden and Helms called the Global Disease Surveillance Act of 2002 reflects the fact that given the speed of international travel, migration patterns and commercial transportation networks, it will not be enough to shore up American public health capabilities and capacities, recognizing that the best BW delivery system might be humans either knowingly or not.

Therefore we must assist others to develop capabilities for disease monitoring, surveillance and response or else leave ourselves vulnerable to the possible exposure to dangerous diseases that could be locally contained. Having recognized the need for more support in this area, the challenge, though, will now be to sustain these efforts both in the United States and elsewhere.

Since these activities have dual benefits enhancing both national and international security and public health, it is hoped that their value will be clearly evident and funding will become an integral and ongoing element of our national and public security systems.

My final recommendation that I want to talk about is renewing international commitment to effective implementation of both the CWC and BWC. Mike has said almost everything I would want to say to tell you the truth, but let me just make some general points.

As strange as it may seem, the nonproliferation regime is at the crux of whether many of the dire fears about WMD become reality. In the last decade, the United States and the UN Security Council have claimed rhetorically that terrorism and the proliferation of weapons of mass destruction are the greatest threat to U.S. and international security, but the actions of too many states call into question their long-term commitment to anti-terrorism and nonproliferation goals.

The rhetoric appears hollow, the commitment to effective action inadequate to the task. It will require U.S. leadership to move forcefully forward. Leadership that involves working within the

CWC and BWC context to ensure compliance, to ensure that there is securing of sensitive and dangerous materials and to strengthen international nonproliferation norms. It will require the United States and others to provide substantial new funding and support to these efforts, to focus on the international needs rather than domestic concerns and to take a long-term rather than short-term approach to these problems.

To conclude, it is clear that what cannot happen is business as usual. While terrorism and proliferation may not be an issue in all parts of the world, it remains a substantial threat in several regions and is capable of acting as a catalyst to other states and subnational groups who might rethink their own decisions not to acquire or to use weapons of mass destruction. Thank you.

[The prepared statement of Dr. Sands follows:]

PREPARED STATEMENT OF AMY SANDS, PH.D.

Dear Mr. Chairman, distinguished Members of the committee, and guests:

I am grateful for the opportunity to appear before you this morning to discuss a topic that while, extensively discussed, deserves a new look from a different perspective.[1] In the wake of events following September 11th, it is vital that we examine certain assumptions regarding the acquisition and use of chemical and biological weapons. It has become crucial that we go beyond traditional thinking and take a close look at capabilities and motivations, not only of state actors but also sub-national and terrorist organizations.

OVERVIEW OF THE CBW THREAT: A TRADITIONAL REVIEW

Since the end of the Cold War, the acquisition and potential use of chemical and biological technologies and materials by state and sub-state actors has become an increasingly real threat. The recent trend towards chemical and biological weapons (CBW) terrorism—most notably the 1995 sarin nerve agent attack in the Tokyo subway and the actual use of anthrax against individuals in the United States, coupled with the state level proliferation of offensive CBW programs, have created a security environment in which defending against chemical and biological attacks by states as well as sub-national groups must be the top priority.

The anthrax letter attacks that occurred last fall only hint at the potential for casualties and widespread panic associated with a BW event. The 9/11 terrorists were able to plot and train secretly over several years to massacre thousands of people and die in the effort. It is conceivable that terrorists with similar dedication could deliberately obtain, weaponize, and disseminate a contagious pathogen such as smallpox or plague, and the results could make September 11th pale in comparison. In an era where people can literally move anywhere around the world within 36 hours—far less than the incubation period of many diseases of concern—all nations could be affected. In addition, advances in biotechnology, and the proliferation of BW know-how and dual-use equipment, might make it possible for terrorists to engineer highly virulent, antibiotic-resistant "designer" pathogens to suit their needs.

Given the destructive possibility of CBW, it is worth quickly reviewing the "state of play." The rest of this section will be devoted to examining state-level CBW capabilities and sub-national groups' interest in and use of CB agents.

CAW Proliferation: State Level

Although the Chemical Weapons Convention (CWC) and Biological Weapons Convention (BWC) impose restrictions on the acquisition and use of these weapons, many states continue to pursue clandestine and offensive CBW capabilities. Roughly 13 states are believed to be actively seeking biological weapons and nearly 20 may be pursuing chemical warfare capabilities. Proliferant states of particular concern include China, Egypt, Iran, Iraq, Israel, Libya, North Korea, Russia, Sudan, and Syria (for more information on state programs please see our website at http://

[1] I am grateful to the staff at the Center for Nonproliferation Studies at the Monterey Institute for their extensive help in preparing this testimony. Specifically I would like to thank Dr. Raymond Zilinskas, Jason Pate, Eric Croddy, Kimberly McCloud, Gary Ackerman, Cheryl Loeb and Jennifer Arbaugh.

www.cns.miis.edu/research/cbw/possess.htm). The analysis here is divided into two categories: 1) unique state threats and 2) other state actors.

Unique State Threats:

North Korea

An analysis of open sources indicates that North Korea has operated an extensive CW program for many years. It is probable that adamsite, mustard, hydrogen cyanide, cyanogen chloride, phosgene, sarin, soman, tabun, and VX are among the agents in its chemical weapons arsenal. In the biological sphere, North Korea has reportedly pursued BW capabilities since the 1960s, and continues research with possible production of anthrax, plague, yellow fever, typhoid, cholera, tuberculosis, typhus, smallpox, and botulinum toxin. North Korea is not party to the CWC but has acceded to the BWC.[2]

North Korea's CW capabilities tell us something about how they might use these weapons. Reflecting Soviet military doctrine, North Korea has traditionally viewed chemical weapons as an integral part of any military offensive. There are no indications that this view has altered since the end of the Cold War. The most obvious tactical use of chemical weapons by North Korea would be to terrorize South Korean civilians. Seoul lies within easy striking distance of North Korea's artillery and rocket systems and, today, the South Korean civilian population has no protection against CW attack.[3]

In terms of more traditional conflicts, the rugged terrain of the northern region of the demilitarized zone affords two main routes for North Korea to capture, or at least lay siege to Seoul, while attempting to deny US forces from landing at strategic ports. It is highly likely that chemical weapons would be used against hard military targets in the South, such as airfields and ports, not only spreading death and injury to a wide area of South Korean personnel, but contaminating these installations with persistent blister and/or nerve agents for area denial. Finally, because much of the North's success relies on preventing US assets in the region coming to the aid of the South, especially those forces deployed in Okinawa and Guam, the latter two could be targeted by Nodong-1, Nodong-2 and Taep'odong missiles, possibly armed with chemical warheads.

It is unclear how the use of BW agents could play in North Korean military planning. While a number of delivery systems mentioned above could be employed to use BW agents against South Korean and US forces, is unknown what validated weapons systems are currently in the North Korean arsenal. As part of an overall offensive, Northern infiltrators in the South could conduct sabotage operations using BW agents, as well as biological assaults from North Korean specialized units. Whether by sophisticated aerosolized agents (anthrax) or crude contamination of food or beverages, such operations may be set into motion if the North decides to conduct full scale military operations against South Korea.

Former Soviet Union/Russia

Probably an even more problematic and troubling situation exists in some of the newly independent states of the former Soviet Union (FSU) because of the scale of its CBW programs, which had developed large quantities of chemical and biological agent for use in a variety of weapons and military scenarios. Insuring the safety and security of these materials while they await destruction presents a significant challenge, but it is not the only legacy of these programs that requires attention.

Western security experts and policy-makers must take seriously the dangers posed by the scope, history, and enduring capabilities of the Soviet offensive BW program. First, the US government, among others, fears that President B. Yeltsin's

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[2] Joseph S. Bermudez, Jr., *The Deterrence Series, Case Study 5: North Korea,* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1998), p. 5; U.S. Department of Defense, *Proliferation: Threat and Response 2001,* [http://www.defenselink.mil/pubs/ptr20010110.pdf], pp. 10–11; Institute for National Strategic Studies, *Strategic Assessment 1997, Flashpoints and Force Structure,* (Washington, DC: National Defense University Press, 1997), [http://www.ndu.edu/ndu/inss/sa97/sa97ch11.html]; Russian Federation Foreign Intelligence Service, *A New Challenge After the Cold War: Proliferation of Weapons of Mass Destruction,* p. 99; "The Actual Situation of North Korea's Biological and Chemical Weapons," *Foresight,* February 17, 2001, pp. 24–25, translated in FBIS; "South Korea Says North Has Biological, Chemical Weapons," Kyodo News Service, October 23, 1992; North Korea Advisory Group, Report to the Speaker, U.S. House of Representatives, November 1999; Bill Gertz, "Hwang Says N. Korea Has Atomic Weapons; Pyongyang Called Off Planned Nuclear Test," The Washington Times, June 5, 1997, p. A12; Republic of Korea, Ministry of National Defence, White Paper, 2000, [http://www.mnd.go.kr/mnden/emainindex.html].

[3] North Korea Advisory Group, Report to the Speaker, U.S. House of Representatives, November 1999.

1992 decree ordering the dismantlement of FSU's BW program is being disobeyed and that secret, BW-related activities contravening the BWC continue in the Russian Federation. The three military biological laboratories at Kirov, Sergei Posad, and Sverdlovsk, which remain closed to foreigners, are especially worrisome in this regard.

In addition, we know that FSU's BW program developed a number of pathogens and toxins for use as biological weapons. While we may not know all the program's accomplishments, it is reasonable to believe that some would be state-of-the-art, possibly posing threats to the West that it is unprepared to meet. A Russian BW program, if it exists, can be expected to build on past accomplishments. It is therefore disturbing to read that Russian military scientists developed new anthrax and plague bacterial strains resistant to antibiotics. For these reasons, a continuing Russian BW program would pose much greater security threats to the West than would the suppressed program of Iraq, or the incipient programs of other proliferant nations, who for the most part are believed to depend on classical agents and technologies developed during and just after World War II.

Turning to the former Soviet Union's CW program, Russia has been in technical noncompliance with the CWC almost since the treaty entered into force. Dealing with catastrophic economic, political, and social problems has left Moscow unable to fulfill its obligations under the CWC. The primary reason for Russian noncompliance has been its inability to destroy its stockpiles in a timely manner. This failure has more to do with lack of funding and the capacity of existing destruction facilities than any real desire by Russia to violate the CWC. However, it has been alleged that Russia purposefully lied in its declarations to the Organization for the Prohibition of Chemical Weapons (OPCW) to hide the actual size of its arsenal. In addition, Russia may have secretly destroyed CW in an effort to help with this obfuscation as well as providing false information several years prior. In March 1994, Valerii Menshikov, a consultant to the Russian National Security Council, said that the Soviet Union had indeed lied in its declarations udder the 1989 Memorandum of Understanding with the United States.[4]

Even more disturbing than the possibility of false declarations and secret efforts to hide arsenal size is the suspicion that Russia has developed, and may be continuing to develop, a next generation type of chemical agent.[5] The program, nicknamed "Novichok" or "new guy," might include agents that are outside the current CWC list of prohibited agents. The first compliance question here is determining the existence of the Novichok program. The main problem lies in the fact that even if the program exists, the agents may not be covered by the CWC. It remains then either to make sure that the CWC covers Novichok, or that there is some way to address this possible noncompliance that may not violate the letter of the treaty, but certainly violates its spirit.

Other State Actors:

China

Even though it is a member state of the both CWC and BWC, it is possible that China is pursuing, or has pursued, chemical and biological weapons programs. China claims to have destroyed three production facilities in keeping with its obligations under the CWC.[6] When looking at evidence of its commitment to the CWC, China appears not to have any CW stockpiles or current production capabilities. However, US intelligence sources maintain that China retains a "moderate" stockpile of CW and has "not acknowledged the full extent of its chemical weapons program," even though it ratified the CWC in 1997.[7] Moreover, China has a large civilian chemical and pharmaceutical production infrastructure that could quickly be redirected toward the production of chemical and biological agents.[8] These uncertain-

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[4] Amy E. Smithson, "A Commentary on the Russian Factor," in Brad Roberts, ed., *Ratifying the Chemical Weapons Convention* (Washington, D.C.: Center for Strategic and International Studies, 1994), p. 102.

[5] See: Dr. Vil S. Mirzayanov, "Dismantling the Soviet/Russian Chemical Weapons Complex: An Insider's View," *Chemical Weapons Disarmament in Russia: Problems and Prospects* (Washington, DC: The Henry L. Stimson Center, 1995) p. 24–25; Clifford Krauss, "US Urges Russia To End Production of Nerve Gas," The New York Times, February 6, 1997. p. A7; and Frank Von Hippel, "Russian whistleblower faces jail," *Bulletin of the Atomic Scientists* 49 (May 1993), [http://www.bullatomsci.org/issues/1993/m93/m93vonhippel.html].

[6] Ibid., p. 67.

[7] *Proliferation: Threat and Response,* Department of Defense (2001), p.15.

[8] Rear Admiral Thomas Brooks, Director of Naval Intelligence, statement before the Subcommittee on Seapower, Strategic and Critical Materials, U.S. Congress, House of Representatives, Committee on Armed Services, "Hearings on National Defense Authorization Act for Fiscal

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ties about China's current activities are compounded by the fact that it has not revealed the scope and nature of its past programs. This lack of transparency, although occurring within the context of technical compliance and diplomatic commitment to the regime, nonetheless fails to provide sufficient confidence-building. In China's case, the infrastructure for weapons development might exist, but the state may have indeed destroyed its stockpile. Simply put, without more information, China's true capabilities remain a mystery and its intent is clouded.

Egypt

The first Arab country to develop, produce, stockpile, deploy, and use chemical weapons (Yemen Civil War), Egypt has pursued a chemical weapons program since the early 1960s. In its chemical weapons arsenal, it is probable that Egypt possesses mustard, phosgene, sarin, and VX. In the biological sphere, it is believed that Egypt has been pursuing a BW program since the early 1970s, and likely maintains an offensive program. Egypt is not a party to either the CWC or the BWC.[9]

Iran

Even though Iran is a party to both the CWC and the BWC, it appears to have continued to pursue offensive CBW capabilities. Iran is believed to have initiated both its chemical and biological weapons programs in the mid-1980s. In its chemical weapons arsenal, Iran has manufactured and stockpiled mustard, sarin, hydrogen cyanide, cyanogen chloride, and phosgene. In regards to BW, Iran has conducted research on anthrax, foot and mouth disease, botulinum toxin, and mycotoxins. It is likely that Iran maintains an offensive BW program.[10]

Iraq

While the current status of Iraq's chemical and biological weapons programs remains unknown due to continuous refusals to allow inspectors from the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) into the country, it is widely believed that Iraq is continuing to pursue offensive chemical and biological weapons programs. Prior to the expulsion of the United Nations Special Commission (UNSCOM) inspectors in 1998, it was ascertained that Iraq had mustard, sarin, tabun, VX, and Agent 15 in its chemical weapons arsenal, along with a sizeable stockpile of chemical munitions. Iraq weaponized the biological agents anthrax, botulinum toxin, ricin, aflatoxin, and wheat cover smut, and conducted BW related research on brucellosis, hemorrhagic conjunctivitis virus (Enterovirus 70), rotavirus, camel pox, gas gangrene toxin, and possibly plague.[11]

Years 1992 and 1993 before the Committee on Armed Services," 102[nd] Congress, Second Session, March 7, 1991, (Washington, DC: Government Printing Office, 1993), p. 107; U.S. Department of Defense, *Proliferation: Threat and Response 2001,* [http://www.defenselink.mil/pubs/ptr20010110.pdf], p. 14; U.S. Department of State, "Adherence To and Compliance With Arms Control Agreements," 1998 Report submitted to the Congress, Washington, DC, [http://www.state.gov/www/global/arms/reports/annual/comp98.html].

[9] Avner Cohen, "Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control," *The Nonprolferation Review,* Vol. 8 No. 3 (Fall-Winter 2001), pp. 27–53; Dany Shoham, "Chemical and Biological Weapons in Egypt," *The Nonprolferation Review,* 5 (Spring-Summer 1998), pp. 48–58; Arms Control and Disarmament Agency, *Adherence to and Compliance with Arms Control Agreements: 1998 Annual Report to Congress,* [http://www.state.gov/www/global/arms/reports/annual/comp98.html].

[10] Cordesman, "Weapons of Mass Destruction in the Middle East," [http/www.csis.org/mideast/reports/WMDinMETrends.pdf], 1999, pp. 38–40; Robert J. Einhorn, Testimony Before the Senate Foreign Relations Committee, Washington, DC, October 5, 2000, [http://www.state.gov/www/policy__remarks/2000/001005__einhorn__sfrc.html]; U.S. Department of Defense, *Proliferation: Threat and Response 2001,* [http://www.defenselink.mil/pubs/ptr20010110.pdf], p. 36; Central Intelligence Agency (CIA), "Report of Proliferation-Related Acquisition in 2001," (Washington, DC: U.S. Central Intelligence Agency, 2001), [http://www.odci.gov/cia/publications/bian/bian__feb__2001.htm]; Anthony Cordesman, *Weapons of Mass Destruction in Iran: Delivery Systems, and Chemical, Biological, and Nuclear Programs,* (Center for Strategic and International Studies, April 28, 1998), [http://www.csis.org/mideast/reports/WMDinIran4-28-98.html].

[11] United Nations, United Nations Special Commission (UNSCOM), "Fourth Report under Resolution 1051," (June 10, 1997), [http://www.un.org/Depts/unscom/sres97-774.htm]; United Nations, United Nations Special Commission (UNSCOM), "Latest Six-Monthly Report," (April 16, 1998), [http://www.un.org/Depts/unscom/sres98-332.htm]; U.S. Department of Defense, *Proliferation: Threat and Response 2001,* [http://www.defenselink.mil/pubs/ptr20010110.pdf] pp. 4 1–42; Steve Bowman, *Iraqi Chemical & Biological Weapons (CBW) Capabilities,* CRS Issue Brief, (Congressional Research Service, April 1998), [http://www.fas.org/spp/starwars/crs/98042705__npo.html]; Milton Leitenberg, *Biological Weapons in the Twentieth Century: A Review and Analysis,* [http://www.fas.org/hwc/papers/hw20th.htm], 2001; Arms Control and Disarmament Agency, *Adherence to and Compliance with Arms Control Agreements: 1995 Annual Report to Congress,* [http://www.dosfan.lib.uic.edu/acda/reports/complian.htm].

Iraq is not a member of the CWC, but acceded to the BWC as a condition of the Gulf War ceasefire agreement.

Israel

The roots of Israel's biological and chemical weapons programs can be traced back to 1948, and the mid-1950s, respectively. Even though little information on the highly secretive programs exists in open sources, it is widely believed that Israel has a large chemical weapons defensive program and is capable of producing and stockpiling various chemical agents. In the biological sphere, Israel is conducting a wide array of biological weapons related research, with a possible production of numerous types of agents. The current CBW program is located at the Israeli Institute of Biological Research (IIBR) at Ness Ziona. Israel is not a party to either the CWC or the BWC. [12]

Libya

Since the 1980s, Libya has produced more than 100 metric tons of nerve and blister agents at the Rabta facility, employed chemical weapons against Chadian troops in 1987, and has attempted to build an underground production facility at a site called Tarhunah. Chemical agents believed to be in Libya's arsenal include mustard, sarin, tabun, lewisite, and phosgene. Libya has conducted research on biological and toxin agents, although the extent of the program is unknown. It is possible, however, that Libya could produce small quantities of BW agents. Libya is not a member of the CWC, but has acceded to the BWC.[13]

Sudan

Although a party to the CWC, evidence in the public domain suggests that it is likely that Sudan has been developing a chemical weapons capability since the 1980s. Sudan is heavily dependent upon foreign assistance for its program, and has traditionally sought foreign assistance from a number of countries that have CW programs, including Iraq. It is possible that Sudan is pursuing a biological weapons program, but there are no reports in the open source to confirm this. Sudan is not a party to the BWC.[14]

Syria

With an estimated CW stockpile in the hundreds of tons, it is likely that Syria has one of the largest and most advanced chemical weapons stockpiles in the Middle East even though it is dependent upon foreign sources for precursor chemicals, materials and equipment, it is likely that Syria is capable of producing and delivering mustard, sarin, and VX. It is likely that Syria conducts biological weapons research on anthrax, botulinum toxin, and ricin, with possible production of such agents. Syria is not a party of the CWC or the BWC.[15]

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[12] Avner Cohen, "Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control," *The Nonproliferation Review,* Vol. 8 No. 3 (Fall-Winter 2001), pp. 27–53; Russian Federation Foreign Intelligence Service, *A New Challenge After the Cold War: Proliferation of Weapons of Mass Destruction,* 1993; Cordesman. "Creeping Proliferation Could Mean a Paradigm Shift in the Cost of War and Terrorism," [http:/www.csis.org/mideast/stable/3h.html].

[13] Russian Federation Foreign Intelligence Service, *A New Challenge After the Cold War: Proliferation of Weapons of Mass Destruction,* 1993, p. 100; Cordesman, "Weapons of Mass Destruction in the Middle East," [http://www.csis.org/mideast/reports/WMDinMETrends.pdf], 1999, p. 17; Department of Defense, *Proliferation: Threat and Response 2001,* [http://www.defenselink.mil/pubs/ptr2001O10.pdf], p. 46; Joshua Sinai, "Libya's Pursuit of Weapons of Mass Destruction," *The Nonproliferation Review,* 4, (Spring-Summer 1997), p. 94; Robert J. Einhorn, Testimony Before the Senate Foreign Relations Committee, Washington, DC, October 5, 2000, [http://www.state.gov/www/policy__remarks/2000/001005__einhorn__sfrc.html]; Arms Control and Disarmament Agency, *Adherence to and Compliance with Arms Control Agreements: 1998 Annual Report to Congress,* [http://www.state.gov/www/global/arms/reports/annual/comp98.html].

[14] Michael Bartletta, "Chemical Weapons in the Sudan: Allegations and Evidence," *The Nonprolferation Review,* Fall 1998; Central Intelligence Agency, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Convention Munitions, 1 January Through 30 June 2001 [http://www.cia.gov/cia/publications/bian/bian__jan__2002.htm].

[15] U.S. Department of Defense, *Proliferation: Threat and Response 2001*, [http://www.defenselink.mil/pubs/ptr20010110.pdf], p. 43; Cordesman, "Weapons of Mass Destruction in the Middle East", [http://www.csis.org/mideast/reports/WMDinMETrends.pdf], 1999; Cordesman, "Creeping Proliferation Could Mean a Paradigm Shift in the Cost of War and Terrorism," [http://www.csis.org/mideast/stable/3h.html]; M. Zuhair Diab, "Syria's Chemical and Biological Weapons: Assessing Capabilities and Motivations," *The Nonproliferation Review,* 5, (Fall, 1997), pp. 104–111; "Devil's Brews Briefing: Syria," Centre for Defence and International Security Studies, Lancaster University, 1996; Central Intelligence Agency, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conven-

Continued

The Non-State Threat: A Fusion of Factors

Alone, the tragic events of September 11, 2001 should be a wake-up call to action. When added together with the emergence of state-sponsored and transnational forms of terrorism and the proliferation of weapons of mass destruction (WMD) technologies and materials in the post-Cold War period, it is clear that we are living in a new security era in which the possibility that terrorists could acquire and use WMD, including chemical and biological weapons, must be seen as real. The anthrax letter attacks, although limited in the scope of their lethality, suggest that future terrorists might well cross the weapons of mass destruction threshold.

It is well known that several terrorist organizations have expressed an interest in or already obtained chemical or biological agents. Aum Shinrikyo, the Japanese doomsday cult, showed its ability to make and use sarin gas in the subway system in Tokyo, albeit not as effectively as it had hoped or planned. The unknown assailant(s) that have plagued the United States with anthrax-tainted letters have shown that manufacturing and dispersement of lethal anthrax is possible. Beyond these well known cases, there are extensive examples of terrorists groups using, or attempting to use chem-bio agents. Other organizations with known interest in chemical and/or biological weapons include: al-Qa'ida. believed to have obtained chemical weapons from Sudan and Iraq and biological agents from the Czech Republic, Kazakhstan, and Indonesia; the Kurdistan Worker's Party, believed to have the precursors needed to produce a sarin bomb; and the Rajneeshees, a religious cult located in The Dalles, Oregon, actually used Salmonella Typhimurium to contaminate food in local restaurants in order to make voters ill before an upcoming election.[16]

Related to this sense of an increased threat is the reality that we are all more vulnerable. Today's global community is the result of several developments, including the diffusion of and increased reliance on technology; increased access to information, technology, and materials; ease of communication and transportation; and the openness of more societies. This certainly enhances economic advancement, but also creates more avenues of access for adversaries. Coupled with this increased access to potential targets is the reality that most countries or sub-national groups cannot defeat the United States in a direct confrontation. These adversaries then look for ways to exploit their access and our vulnerabilities. So, what is new is the vulnerability of modern, open society to terrorists with such an open-ended agenda. While we have moved away from the threat of global annihilation, we may have moved closer to the actual use of mass destruction weapons in situations where the United States may have little influence or be the target. In short, Americans may not be worried about a Russian nuclear attack, but now must fear a more random set of events producing some catastrophe in their local environment, without any notice or early indicators.

Moreover, it now has become apparent that certain thresholds have been passed—until September 11th, no more than 1,000 Americans had died in terrorist incidents at home or abroad since 1968. Our speculation on whether terrorists would and could kill thousands of people has been answered. The problem is that this should not have surprised those of us in the field because, at least since the first world trade center bombing, it has been clear that there existed a network of terrorists, loosely tied by extreme Islamic teachings, willing to try to cause harm to large numbers of people. Ramzi Yousef, the perpetrator of that incident was quite clear in his intent in 1993 to kill 50,000 or more Americans. He and others planned a variety of terrorist acts that if successful would have caused large numbers of deaths and casualties.

Several factors have come together to increase the likelihood of CBW acquisition and use by sub-national groups. First, terrorists may see CBW as giving them a new advantage. They know we are incredibly worried about such a possibility and may believe such an attack will not only kill many Americans, but also could psychologically "freeze" the United States.

Second, chem-bio materials are available and there is clear evidence of terrorists being interested in obtaining these materials. This supply-demand dynamic could easily be played out at biological research institutions in the FSU. If security is poor or lacking, as many suspect at these institutions, they would be vulnerable to theft of pathogens, toxins, and other material of potential use by criminals, other countries, or terrorists. Most important, after theft, it would be easy for the perpetrator to hide and transport seed cultures of organisms that could be directly used in biological weapons or to produce toxins.

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tion Munitions, 1 January Through 30 June 2001," [http://www.cia.gov/cia/publications/bian/bian_jan_2002.htm].

[16] David E. Kaplan, "Aum Shinrikyo (1995)," in Jonathan Tucker, ed., *Toxic Terror* (Cambridge, MA.: Belfer Center for Science and International Affairs, 2000), pp 123, 128–129.

Third, some terrorists groups exist that are clearly capable of organizing and operationalizing the type of complex long term effort that would be needed to develop and effectively deliver CBW agents. The planning effort behind the September 11th events was both long term and complex, and it surprised many that terrorists could sustain such an effort. it clearly signaled a level of commitment and operational thoroughness thought to be beyond most terrorist groups.

Fourth, cooperation between groups and with states possessing CBW capabilities may be growing. An example of such cooperation is reflected in Iran's relationship with three terrorist groups, Hamas, Hizbollah, and Islamic Jihad. In April 2001, Iran reiterated its unflinching support for those terrorist groups working against Israel by hosting the International Conference on the Palestinian Intifada in Tehran, which was convened by the Iranian parliament. Those invited included leaders from Hamas, Hizbollah. and Islamic Jihad, presumably to encourage greater cooperation between these groups in their campaigns against Israel. At the conference, Iran's religious leader Ayatollah Khamenei repeated his description of Israel as a "cancerous tumor" ripe for removal.[17]

Finally, the technical workforce needed to develop effective CBW is available and "cheap." This concern about workforce availability deserves more attention. As is well known by now, the Soviet Union established a powerful, well-funded secret program to acquire biological weapons. In 1992, President B. Yeltsin acknowledged the BW program's existence and decreed that it be discontinued and dismantled in Russia. The decree's effect, when combined with the general decrease in public support by the Russian government for science, led to drastic funding cuts for the BW program. Although we do not know the full consequences of these measures, some dedicated BW facilities (such as Stepnogorsk) were closed down and many others downsized (including Obolensk and Vektor). Hundreds, perhaps thousands, of scientists, engineers, and technicians were fired or had their wages cut.

In general, the Western governments have viewed the condition of the FSU weapons research institutions with apprehension. Whether the mission of a weapons research institution lies in the biological, chemical, or nuclear area, the problem is similar: What will happen to the expertise inherent in these institutions as some dissolve and others are down-sized? Two concerns of Western governments include: Might institutions on the verge of extinction be contracted by foreign governments or sub-national groups to develop weapons? And could scientific workers that they employ be induced to relocate to proliferant countries by offers of high salaries and bonuses?

Due to the difficult conditions under which science operates in the FSU, and in consideration of the dissolving or diminishing weapons research institutions, these countries are likely have a substantial number of disgruntled and frustrated scientists and engineers with expertise in the biological weapons area. Some may be enticed by high salaries and other inducements to work for foreign governments, sub-national groups, and criminals to develop biological weapons. It is known that especially Iran has made strenuous attempts to recruit weapons scientists to work in that country by offering them high salaries (in excess of $6,000 per month).

But the concern about the clandestine recruitment of scientists from dismantled CBW programs should also include South Africa and the former Yugoslavia. CBW related activities first started in South Africa under British rule in the 1930s and continued during the Second World War with the production of mustard gas. But it was not until 1981 that the official South African program, code-named Project Coast, began operations. Ostensibly to provide the South African Defence Force with detection and protection capabilities, Project Coast became a highly secretive program that engaged in offensive research. With an annual budget of 10 million dollars a year, and with an estimated staff of 200, Project Coast employed a number of scientists, physicians, and technicians to work on both chemical and biological weapons research, development, and production (exact numbers of scientists and other employees of the program have not been published by the South African Government). [18]

When Project Coast was terminated in 1993, it left a number of weapons scientists and technicians suddenly out of work, therefore raising the possibility that a number of these specialists may have been induced to work for foreign governments and sub-national organizations. Further compounding this threat is the

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[17] Source: U.S. Department of State. "Overview of State-Sponsored Terrorism" in *Patterns of Global Terrorism 2000,* Released by the Office of the Coordinator for Counterterrorism, (April 2001), found on the Internet at [http://www.state.gov/s/ct/rls/pgtrpt/2OOO/].

[18] Stephen Burgess and Helen Purkitt, *The Rollback of South Africa's Biological Warfare Program,* INSS Occasional Paper 37, (USAF Institute for National Security Studies, February, 2001), [http:www.usafa.af.mil/inss/ocp37.htm].

knowledge that in the early 1990s, after the termination of the CBW program, Dr. Wouter Basson, the former head of the CBW program, made frequent trips overseas. Of particular concern were a series of visits made to Libya between 1992 and 1995 as a representative of a South African industrial conglomerate Transnet, to promote its transportation and hospital equipment interests. His lack of expertise in this field and his special experience in CBW programs, combined with the efforts of the Libyan government to develop an indigenous CBW capability, led to concern that he was selling his CBW knowledge.[19]

Yugoslavia provides another example. Prior to its breakup in 1991, the Yugoslav National Army had a chemical weapons program consisting of four weapons facilities, three in Serbia and one in Bosnia. Chemical agents in the Yugoslavian arsenal included sarin, mustard, and CS.[20] It should be noted, however, that there is limited information in the open source literature to determine accurately where many of the former scientists currently reside. The possibility exists that former Yugoslavian weapons scientists could have been recruited by foreign state and sub-state actors interested in developing a chemical weapons capability.

A CBW THREAT REALITY CHECK

Having outlined the recognized state and terrorist threats, it is worth looking at these threats from an additional dimension. Too often we comfortably reiterate the same threat mantra without examining more closely certain underlying assumptions. Discussed below are several traditionally accepted statements often found in threat assessments that deserve to be challenged.

Assumption: Terrorists don't have physical locations to make/store materials

It is often argued that terrorists may have safe havens, but will still lack a physical infrastructure to develop CBW. Also, it has been assumed that it will be virtually impossible to detect terrorists hunkering down in caves and basements and working on CB agents. However, an often overlooked point is that terrorist groups can and have actually possessed recognizable (and targetable) CBW facilities. While this possibility is not a new concern, the extent of it occurring and its implications may not be fully recognized.

The US government has viewed the subject of terrorist facilities with concern, but little public discussion has developed about terrorists having CBW facilities within their safe havens as well as within established western states. An early, but well publicized, example was the Clinton administration's controversial cruise missile attack on the Al-Shifa pharmaceutical plant in Sudan on 20 August 1998. It argued that the plant was linked to Bin Laden and that it was not a pharmaceutical plant, but a chemical weapons manufacturing complex that was engaged in the production of the nerve agent VX.

At the other extreme of public exposure are the facilities in the former Yugoslavia. On 8 July 1999, the Italian newspaper Corriere della Serra indicated that members of the World Islamic Front Against Jews and Crusaders, which was founded by Bin Laden, had purchased three chemical and biological agent production facilities in the former Yugoslavia in early May 1998. According to the article, one such facility was erected in the Bosnian village of Zenica. The report also stated that another factory was built near Kandahar, Afghanistan. There was no open investigation or diplomacy, and certainly no cruise missile, directed against these facilities at that time. Allegedly, members of the World Islamic Front for Fighting Jews and Crusaders hired Ukrainian scientists to manufacture unspecified poisons and train Bin Laden's activists in the use of these substances as weapons. The activists would be trained to insert the chemical agents and toxins into explosive devices. Bin Laden planned to send the chemically-trained warriors back to their home countries or to cells in Europe.[21]

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[19] James Adams, "Gadaffi Lures South Africa's Top Germ Warfare Scientists," Sunday Times, February 26, 1995; Alexandra Zavis, "Mandela Says Chemical Weapons Figures May Be in Libya," Associated Press, March 2, 1995; Peta Thornycroft, "Poison Gas Secrets Were Sold to Libya," Weekly Mail & Guardian, 13 August 1998.

[20] The Federation of American Scientists, "Chemical Agents in the Former Yugoslavia," *Nuclear Forces Guide,* [http://www.fas.org/nuke/guide/serbia/cw/index.html], April 23, 2000; Judith Miller, "U.S. Officials Suspect Deadly Chemical Weapons in Yugoslav Army Arsenal," New York Times, April 16, 1999.] After the breakup of the country in 1991, it is believed that the army of the Federal Republic of Yugoslavia inherited much of the CBW program, Human Rights Watch, *Clouds of War: Chemical Weapons in the Former Yugoslavia,* March 1997, [http://www.hrw.org/reports/1997/clouds/].

[21] James Bennet, "U.S. Fury on 2 Continents: The Overview; U.S. Cruise Missiles Strike Sudan and Afghan Targets," The New York Times (21 August 1998): A1.

During the war in Afghanistan, US intelligence officials pinpointed two sites that may have been used by al-Qa'ida to produce chemical weapons. The United States believes cyanide was produced at a crude chemical facility in the small village of Derunta (Darunta), near the city of Jalalabad in eastern Afghanistan.[22] The secret laboratory contained bottles of cyanide poison and bomb instruction manuals, and was allegedly run by a man named Abu Khabab.[23] A fertilizer plant in the northern town of Mazar-e-Sharif is also suspected of playing a role in possible chemical weapons production. [24]

Beyond al-Qa'ida there is Aum Shinrikyo, who, through substantial contributions from wealthy members, purchased a wide variety of businesses and facilities including a medical clinic, computer stores, and trading companies. Also, the cult purchased land in Japan, on which they built a compound where they were able to pursue research and development of various dangerous and potentially lethal materials. Using its businesses as a front, the cult could claim some legitimacy for its pursuit of certain chemicals and technology. Although most of the chemicals were obtained from within Japan, Aum purchased some materials from the United States and attempted to buy weapons and technology from Russia. In addition, the cult bought a ranch in a remote area of Australia to carry out testing of nerve agents.

As all these cases demonstrate, terrorists have had access to or possession of facilities. Some of these may even be located outside of safe havens and may appear legitimate, making the task of detecting and identifying them accurately much more difficult.

Assumption: A certain set of CB agents, such as VX, sarin, anthrax, and smallpox, are the most likely CBW agents to he used

Cyanide is a chemical that has sometimes been overlooked as a weapon in favor of more lethal and "glamorous" chemical agents like sarin and VX. Yet the wide availability of various cyanide containing compounds, which are widely used in industrial processes, make cyanide (either in the form of hydrogen cyanide gas or as a solid or liquid contaminant) one of the more likely WMD agents that can be used to attack localized targets.

The WMD Terrorism Database of the Center for Nonproliferation Studies at the Monterey Institute records 52 possessions, plots or uses involving cyanide by terrorists. These cases have so far collectively resulted in only 124 injuries and 13 fatalities, but the danger lies more in the intent of the perpetrators than their results, as sooner or later some group or individual will overcome the technical hurdles associated with conducting an effective cyanide attack.

In addition to consumer products periodically being contaminated with cyanide (the Tylenol and Chilean grape scares in the 1980s are well-known), cyanide has been extensively used by a variety of terrorist groups. The LTTE (Liberation Tigers of Tamil Eelam) have allegedly used cyanide on several occasions against Sri Lankan government troops and in 1999 Kashmiri separatists were found in possession of at least 3 kilograms of cyanide which was to be used to poison water tanks used by the Indian army. Right-wing groups have also shown a particular interest in cyanide. In both 1985 [25] and 1998, [26] domestic right-wing terrorist groups plotted to inflict large numbers of casualties by poisoning the water supplies of major American cities with cyanide; in 1993, the AWB, a South African right-wing group, planned a similar action in order to disrupt the country's first multi-racial election; and in 1988, a group calling itself the Confederate Hammerskins formulated a plan to pump cyanide gas into the ventilation system of a synagogue in Dallas, Texas. Aum Shinrikyo, the Japanese doomsday cult, tried on three occasions in 1995 to employ binary weapons that were designed to release hydrogen cyanide gas but failed either because they were detected in time or did not operate properly.[27] The arrest in Chicago in early March of a man found to be storing significant amounts of potas-

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[22] "Chem-War sites found," Toronto Sun (11 November 2001); 2.

[23] "War in Afghanistan: lnside Bin Laden's chemical bunker," The Guardian (London) (17 November 2001); 3.

[24] Ibid.

[25] The Covenant, the Sword, and The Arm of The Lord was found in possession of a drum of potassium cyanide, which was to be used to poison the water systems in New York, Chicago and Washington, believing that God would ensure that no Aryans would be killed.—Stern J. "The Covenant, the Sword, and the Arm of the Lord" in Tucker, J. (ed.) *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons,* MIT Press, Cambridge, MA. (2000), p. 151.

[26] During court proceedings in 1998, it was revealed that members of a white supremacist group calling itself "The New Order" proposed the use of a 50-gallon drum of cyanide to poison the water supplies of major cities. "Supremacists had hit list, FBI agent says," The New York Times (7 March 1998): A14.

[27] Database cases 210, 213, 216.

sium and sodium cyanide in subway tunnels highlights the ease with which even lone individuals can acquire this poison.

Even the United States' current terrorist nemesis, al-Qa'ida, has shown an interest in cyanide as a weapon. Ahmed Ressam, the terrorist convicted of plotting to bomb Los Angeles International Airport during the millennium celebrations, claimed that in 1998, while in an al-Qa'ida camp in Afghanistan, he had been trained how to kill people with cyanide.[28] Mr. Ressam stated that he was trained to poison individuals by smearing an oily mixture of cyanide and other toxic substances on door handles. His terrorist masters also taught him how to introduce cyanide gas into public ventilation systems in order to affect the maximum number of victims, while minimizing the risk to the perpetrator.[29] The February 2002 arrest in Rome of nine Moroccans with potential links to al-Qa'ida for allegedly planning to poison the water supply of the US Embassy using potassium ferrocyanide shows that al-Qa'ida's interest in cyanide is hardly waning.[30]

Assumption: States won't provide terrorists with CBW

Compounding the threat to US national security is the possibility that states with CBW programs or related dual-use technologies could provide sub-national actors with these deadly tools. The issue of state sponsorship of terrorism has been a problem commonly associated with rogue states in the Middle East. States such as Iran, Iraq, Libya, Syria, and Sudan have been linked to numerous terror organizations, providing them with a wide variety of assistance, including financial support, weapons and other equipment and materials, and even specialized training bases. Even though there has been little evidence to indicate that any of these states have transferred CBW material, technology or know-how to such terrorist organizations, the possibility cannot be ruled out. The more states that proliferate and pursue chemical and biological weapons programs, the greater the possibility that sub-national actors will acquire them, either from direct assistance or through other covert means, including theft.

Many of the same states identified as terrorist sponsors are also those accused of attempting to acquire CBW capabilities. Under certain circumstances the leaders of these countries may decide the only practical utility they can derive from their CBW arsenals is by deploying them covertly, using sub-national actors as means of delivery.

Even if a state may not be willing to transfer CBW related technologies to a sub-national actor, one cannot discount the possibility of rogue elements within a government—such as an extremist clique within the Iranian intelligence apparatus—being prepared to take more risks than the Government as a whole. Within national CBW programs, disgruntled or underpaid scientists, or individuals sympathetic to terrorist causes may also be willing to illicitly transfer CBW related technologies and know-how to terrorist groups. in summary, the threat that a state actor may indirectly or directly transfer CBW related technologies, equipment and scientific know-how to a sub-national actor is a threat the US government cannot ignore.

Assumption: Terrorists won't use CBW except in extreme cases

With the exception of the terrorist group Aum Shinrikyo, the long held assumption has been that sub-national groups and terrorists will not use CBW except as a last resort. Many state players perceive a threshold created by international norms that prevents them from openly using CBW. However, non-state players, especially terrorists, do not act under the same restraints as sovereign states. It is possible that these organizations do not perceive such a threshold. Moreover, their assessment of the costs and benefits of using CBW cannot be measured on the same scale as that of nations. Terrorist organizations and religious fanatical groups are not under the same political restrictions as sovereign states. In fact, if the motivation of an organization is to infuse terror, then use of CBW even on a small scale, might be seen as furthering their cause. Omar Bakri Mohammed, an Islamic cleric with ties to Islamic Jihad (and Hamas), advocated the use of biological weapons

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[28] Steven Grey, Dipesh Gadher, and Joe Lauria, "What bin Laden taught Ressam: From gruesome experiments with poison gas to the art of bombmaking," The Ottawa Citizen (7 October 2001): A1.

[29] Steven Edwards, "Ressam Eyed Canadian Targets," National Post Online (6 July 2001); Intenet, available from [http://www.nationalpostonline.com], accessed on 7/12/01; and Laura Mansnerus, "Testimony at Bombing Trial Outlines Recipe for Mayhem," New York Times (6 July 2001): B2.

[30] This form of cyanide is however only mildly toxic and would be difficult to turn into an effective weapon.

against "western" forces, saying "if any Muslims are under occupation by a western force, they can use any weapon to survive and that includes biological weapons."[31]

The disparity between Israeli and Palestinian forces may lead to the use of CBW in an effort to balance the scales. This thought was expressed in the Palestinian weekly Al-Manar:

> While the human-bombs [meaning, suicide bombers] may be followed [and maybe stopped by] preventive measures ... serious thinking has begun for a while about developing a Palestinian weapon of deterrence. This weapon terrifies the Israeli security apparatuses, from time to time, mainly because obtaining its primary components, whether biological or chemical, is possible without too much effort, let alone the fact that there are hundreds of experts who are capable of handling them and use them as weapons of deterrence, thus creating a balance of horror in the equation of the Palestinian-Israeli conflict. A few bombs or death-carrying devices will be enough, once they are deployed in secluded areas and directed at the Israeli water resources or the Israeli beaches, let alone the markets and the residential centers. [This will be carried out] without explosions, noise, blood, or pictures that are used to serve the Israeli propaganda. Anyone who is capable, with complete self-control, of turning his body into shrapnel and scattered organs, is also capable of carrying a small device that cannot be traced and throw it in the targeted location.[32]

Thus, an asymmetric conflict, even where the imbalance is not so great, can be used as justification for turning to CBW. it would be folly not to recognize and respond to all the trends pointing to the CBW option as one increasingly attractive to terrorists.

Assumption: US must focus efforts on homeland security and defense

While this assumption is not wrong, it may lead to neglecting other venues in which US interests or allies are at risk. A good case in point is US Central Command in the Middle East. It is very much at risk given its location in the heart of some of the most anti-American groups. It would be a mistake to pour so much into enhancing US domestic security when equal attention should be given to those Americans mobilized and deployed to protect us. In addition, planning for responding to CBW terrorism must consider providing assistance to allies. What if Italy is the site of a smallpox attack—we had better have planned some way to have adequate resources available to contain the consequences of such an attack. This means having vaccine available in some international organization or stockpile above and beyond what is needed for the US population.

RECOMMENDATIONS

We have to be prepared to respond to chem-bio events and to do everything we can to prevent them from ever occurring. But, that will require new ways of approaching old, evolving, and emerging perils.

First, what is required is innovative thinking and a re-conceptualization of threats in the 21st century. In past years, when terrorists were unlikely to have the capability to cause or even seek mass casualties, US foreign policy could focus on the more critical and traditional problem of state threats. Even in the aftermath of the collapse of the Soviet Union and subsequent re-making of the world order, it was clear who the enemies were (Iraq, North Korea), and these enemies were defined not only by their antagonism towards the United States and its values, but also by the fact that they were seeking weapons of mass destruction.

Addressing even the "old" threats will require more than just military power. It requires a long-term dedication to a multi-dimensional and multi-faceted approach that seeks to prevent WMD acquisition and use, strengthens anti-proliferation norms, develops adequate defenses here and elsewhere, and prepares for effective consequent mitigation and management in the advent of a WMD attack. Specifically, this means not only putting significant money into US military and intelligence capabilities, but also into international organizations and collaborations. It involves finding ways to bridge gaps within the US government as well as between states, communities, and even tribes. It also means forging new partnerships and

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[31] "Refugee Calls for Biological Weapons Against the West," Metro (London), 6 September 1999.

[32] Taufiq Abu-Khosa, "Will We Reach the Option of Biological Deterrence?" Al-Manar. An excerpted translation can be found on the Middle East Media Research Institute website at: [http://www.memri.org/sd/SP25501.html].

helping to build trust and cooperation in areas where these have been scarce commodities.

Second, the United States, while recognizing the ongoing threat from proliferant states, also faces a threat from a new type of terrorist. The US appears to be approaching the problem of mass-casualty transnational terrorism, and the possibility of terrorist use of WMD, in a manner consistent with deeply entrenched Cold War assumptions about warfare and deterrence. The terrorists of today do not, by and large, behave like states, nor are they part of the international "system." Addressing those terrorists who seek and obtain WMD will require much of the same effort that has been expended on states in the past, plus a strategy that addresses the root causes and nature of terrorism. Long-term approaches that go beyond the next election must be incorporated into the national counterterrorism strategy. These approaches include investing in states that are in danger of collapse in order to prevent the spiral into statelessness that creates a haven for terrorism; involving allies and partners in regional confidence-building measures that are designed to validate US policy to the publics of other nations rather than just the governments; and creating an international safety net to ensure that the rule of law and social infrastructures remain intact even through conflict.

What are some of the more specific activities that might need to be pursued? The following six areas of effort emerge as critical if the United States is to be successful in its war on terrorism and WMD proliferation:

- enhancing global WMD materials protection, control and accounting;
- supporting displaced WMD scientists and technical experts to keep them employed doing constructive, socially beneficial projects;
- enhancing intelligence collection, analysis, coordination, and cooperation;
- strengthening the public health sector within the United States and internationally;
- renewing international commitment to effective implementation of both the CWC and BWC; and
- making meaningful investments to address underlying causes of terrorism, such as poverty, illiteracy, and socio-economic inequities.

Enhancing global WMD materials protection, control and accounting (MPC&A)

The United States must continue its support of improved MPC&A procedures in the FSU and expand these activities to include sensitive chem-bio materials and to be international in scope. Although the United States has supported numerous activities within the former Soviet Union to enhance nuclear weapons and nuclear materials protection, control and accounting since the end of the Cold War, these efforts have not really addressed similar problems with chem-bio materials either in the former Soviet Union or elsewhere in the world. Chemicals of concern are controlled to some degree under the CWC and the Australia Group which provide a normative and international framework for national and international regulation. However, nothing similar exists for dangerous biological materials and this gap deserves greater attention.

The BWC does prohibit the transfer of toxins, agents, weapons, equipment, or means of delivery prohibited under the treaty to any other state, group of states, or international organization. However, this prohibition is limited in several ways: it does not address the concern we now face with terrorists, nor is there any implementing mechanism, nor does it directly address the problem of security and safety of materials while being transferred, stored, or used. Consequently, there is a missing link in our efforts to contain the threat from dangerous pathogens, one that must be dealt with on both the national and international levels.

The anthrax incidents of this past fall and the ensuing investigation clearly indicates that the United States does not have good control over the collection of pathogens within US territory. When one looks beyond the United States, the situation is even more disconcerting. While the World Federation for Culture Collections is an association of 472 repositories of living microbial specimens in 61 countries, it lacks any ability to require of its members tight controls on access to these materials, nor can it force compliance on the membership. Also, the WFCC has as members only a small portion (less than 1/3) of the 1500 germ banks worldwide. In evaluating the security and protection globally of these dangerous materials, it is quite apparent that without much trouble terrorists could easily steal or buy them illicitly. Thus, although the United States needs tighter regulations, such an effort will have little meaning unless there is a similar international initiative. The United States and its allies must make it a priority to fill this security gap by pursuing

vigorously enhanced national regulations that control and secure deadly pathogens and toxins and by launching the negotiation of a new "Biosecurity Convention."

Such a Convention would compliment the BWC by developing a set of specific, concrete regulations and activities that guarantee the control, accounting, safety, and security of dangerous pathogens and toxins. It would include, at a minimum, the following four components: (1) a legal commitment by the contracting parties; (2) agreed principles for developing progressively higher standards with respect to regulation and licensing of microbial culture collections; (3) mechanisms for oversight and their progressive refinement; and (4) compliance and enforcement measures. To initiate this process, the United States should work with Europe, Japan, and other like-minded states to develop the national legislation needed to prevent misuse and unauthorized access to dangerous biological agents and toxins. Using these efforts as models, the United States must lead the effort on an international level and with industry and academia to define international standards of safety and security in the biotechnology sector so that we have more control over where materials of concern are, who has access to them, how they are controlled, and how they are stored and transferred. By engaging the international community in the negotiation of a Biosecurity Convention, the United States will be pursuing an activity that will reduce the access to dangerous pathogens and thus reduce the threat of biological weapons proliferation and terrorism.

Supporting displaced WMD scientists and technical experts to keep them employed and engaged in constructive projects and careers

A critical aspect of any state or terrorist group effort to acquire and use CBW is having sufficient technical expertise to develop an effective weapon. As indicated earlier in this testimony, several states have had CBW programs that no longer exist and the personnel from these programs (perhaps numbering in the thousands) may be without jobs or at least without adequate wages. This workforce issue should not be seen as involving only the FSU, but must address similar concerns that exist for South African and Yugoslavian former bio-weaponeers.

While the United States through the Cooperative Threat Reduction program and a few other initiatives has tried to address these "brain drain" concerns in the FSU, the amount of effort directed towards former CBW personnel has been insufficient. A revitalized and focused commitment to working with Russia and the other relevant states of the FSU to provide adequate jobs, wages, and living conditions to these experts must be immediately pursued. In addition, collaborative discussions and programs should be pursued to address conditions in other countries. Finally, ethics courses should be developed and provided to those entering chemistry or biology fields to put their eventual work and careers into a broader societal framework. Without a much greater level of attention being given to workforce component of the threat, we will live in a continued state of fear that these experts may be lured into working for states or sub-national groups with malicious intentions or may find themselves disgruntled enough to act alone using their expertise for disastrous results.

Enhancing intelligence collection, analysis, coordination, and cooperation

The issue of improving the capacity and capabilities of the US intelligence community has been discussed in great detail in other contexts, but two points deserve mention. First, while there have been numerous studies, commission reports, and meetings concluding that the intelligence community needs to integrate much more effectively open source information, in reality this has not been done to the degree needed. In part this is because of a mind set which constrains analysts from seeing the value in non-classified information; in part it is because there are few analysts that have the language and area studies expertise to exploit adequately unique open source materials; and in part it is because there is already too much classified information for most analysts to try to wade through an additional stack of open source materials on a regular basis.

The first recommendation is to develop incentives and organizational structures that encourage and facilitate the use of open source materials. The second suggestion is to hire more regional experts and actively encourage the acquisition of such language and area expertise with scholarships and funding for relevant educational programs. Finally, information technology is making great strides in being able to filter, bin, and even prioritize data, but the R&D efforts in this area need to be better coordinated and grounded in reality, i.e., analysts need to be integrated into these efforts at the beginning, middle, and end of the activities so that they are given tools that they are willing to use to become better analysts.

The second point has to do with improved cooperation and coordination. Since September 11th, great strides appear to have been made in inter-agency information

sharing and collaboration. But, more is necessary and more agencies have to be drawn into the circle. More importantly, international collaboration must continue to be enhanced and expanded as appropriate. Success in this area requires high-level attention and leadership to overcome institutional practices, mistrusts and rivalries.

Strengthening the public health sector within the United States and internationally

My two recommendations in this area reiterate what others in numerous meetings, hearings, and reports have indicated, namely that we need to strengthen our own public health sector and that we need to work with other international groups and foreign governments to do the same internationally. Last fall's events were unnerving enough to get much-needed political support and funding to strengthen domestic public health preparedness by improving disease surveillance and monitoring, communication networks, training, response capabilities, and laboratory facilities. In addition, the proposed draft legislation of Senators Biden and Helms called "Global Disease Surveillance Act of 2002" reflects the fact that given the speed of international travel, migration patterns, and commercial transportation networks, it will not be enough to shore up American public health capabilities and capacities. We must assist others to develop capabilities for disease monitoring, surveillance, and response or else leave ourselves vulnerable to being affected unnecessarily to dangerous diseases (whether intentional or not) that could be locally contained if detected in a timely way. Having gotten more support today, the challenge now is sustaining these efforts both in the United States and elsewhere. Since these activities have dual benefits—enhancing national and international security and public health, it is hoped that their value will be clearly evident and funding will become an integral and ongoing element of our national and public security systems.

Renewing international commitment to effective implementation of both the CWC and BWC

Over the last decade, the United States and the UN Security Council have claimed rhetorically that terrorism and the proliferation of weapons of mass destruction are the greatest threats to US and international security. Whether it is the inability of the UN Security Council to address effectively the problems of Iraq's unresolved WMD capabilities, or the unwillingness of Russia and China to make fully transparent their past CBW activities, states in general have not recognized their own need for compliance, nor the need to enforce compliance standards on others. The regime appears threatened by a degradation in effectiveness that may paradoxically lead to what it was developed to prevent—weapons proliferation, growing security threats, and an increased likelihood of violent, wrenching conflicts. We are at a critical juncture as far as it concerns proliferation-related security threats, a time in history when muddling and making political deals may no longer be sufficient, when difficult choices must be made and sacrifices endured to reach the next level of national as well as international security and stability.

But looking at the record of the last five years does not bode well for the next ten years. The actions of too many states call into question the long term commitment to anti-terrorism and nonproliferation goals: the rhetoric appears hollow, the commitment to effective action inadequate to the task. It will require US leadership to move forcefully forward, leadership that involves working within the CWC and BWC contexts to ensure compliance, secure access to sensitive and dangerous materials, and to strengthen the international norms. It will require the United States and others to provide substantial new funding and support to these efforts, to focus on the international benefits rather than national demands involved, and to take a long term rather than short term approach to these problems. What can not happen is "business as usual." While terrorism and proliferation may not be an issue in all parts of the world, it remains a substantial threat in several regions and is capable of acting as a catalyst to other states and subnational groups who might rethink their own decisions not to acquire or use weapons of mass destruction.

Making meaningful investments to address underlying causes of terrorism, such as poverty, illiteracy, or socio-economic inequities

The United States must realize that problems such as failing states, decades of unresolved, bitter conflict, or poverty and socio-economic inequalities provide the breeding ground for angry, alienated individuals and groups. With little to lose and perhaps much to gain in terms of spiritual or political legacies, these individuals develop values and moral frameworks that justify violence and possibly mass destruction. If we ignore their efforts to address their grievances, we risk always being the target, always being hated, and always failing to move our own community and the international community to greater stability and security. Simply put, this recommendation requires a long term commitment to making the world a better place

for all, which does not mean that we should impose our way of life on others or accept theirs. It does mean that we remain an active, constructive player in multilateral affairs, that we try to improve the quality of life for everyone, that we help in whatever ways possible to resolve ongoing conflicts, and that in all of this we act generously and with humility. While it may not be possible to respect the success of the Marshall Plan in Europe, it may be worth the effort to try to find a new version appropriate for areas such as Afghanistan, Somalia, or even the Middle East.

The CHAIRMAN. Thank you, Doctor.

Doctor Zelicoff.

STATEMENT OF ALAN P. ZELICOFF, SENIOR SCIENTIST, SANDIA NATIONAL LABORATORIES

Dr. ZELICOFF. Thank you, Mr. Chairman. It's a high honor to be asked to testify in front of you today. I've followed the committee's work for many years and I never really thought I'd have the opportunity to be sitting in this seat testifying in front of you and also in such esteemed company.

At the same time, I know that I'm charged with profound responsibility to clearly address the role of foreign policy in strengthening our national security posture with regard to bio-terrorism. My testimony will be based on my very best scientific assessment of the technologies currently available and unfortunately also on my admittedly limited understanding of the complexities of international relations.

Nonetheless, I believe there are shared interests among countries, I call it an enlightened self interest, that make possible an immediate and substantive improvement in our counterterrorism strategy. Mr. Chairman, I develop technology that I believe assists the medical and public health community in identifying disease outbreaks natural or otherwise with more data utility than we currently have and in a much shorter time frame than exists in the existing surveillance system.

We are in fact testing that technology in the United States and overseas. Interestingly I would note, that the contributions of our Russian colleagues has much to everyone's surprise been profoundly important in fostering and improving these novel approaches. My message today to the committee is a simple one.

The CHAIRMAN. Substantively, Doctor, you mean you're surprised that they have attempted to cooperate or that they have made such a contribution?

Dr. ZELICOFF. Substantively, sir.

The CHAIRMAN. Scientifically?

Dr. ZELICOFF. Indeed.

The CHAIRMAN. Thank you.

Dr. ZELICOFF. My message to the committee is a simple one. We must rethink our approach to the unique challenges of bio-terrorism. The standard tools of intelligence and of international diplomacy function very poorly in this arena. I'm no expert in gathering intelligence, but I am a daily consumer of it and the peculiar aspects of the bio-weapons craft, small sites and absence of signatures, ubiquitous availability of organisms make it awfully difficult for analysts to locate, predict or anticipate an attack except in the most general of terms.

Similarly, traditional arms control which includes declarations, inspections, counting and compliance judgments fall flat in adding any substantive strengthening of treaties such as the Biological Weapons Convention. Quite to the contrary in fact, U.S. tests of proposed verification measures under the recently failed protocol for the BWC demonstrated rather clearly that most measures were not merely worthless, but actually worse than worthless. They provide data of such ambiguity as to confuse rather than enlighten and undermine rather than strengthen the confidence and compliance with the convention.

I think that UNSCOM activities further underscored the severe limits of intrusive on-site inspections in uncovering even an enormous bio-weapons program in Iraq. Thus the Administration was correct in my view to reject the BWC monitoring protocol that was but a rehash of highly fallible verification techniques.

But fortunately the news is not all bad here. I believe that we can address many perhaps most of our counterterrorism needs through shared interests in the international community in disease monitoring, bio-security arrangements, as has recently been mentioned and assistance, and at least among our allies, collective preparedness against bio-terrorism.

The central and most substantive facet is an enhanced disease surveillance system accomplished through an inexpensive, international, secure Internet-based system that's located in primary care physicians' offices and clinics and some hospital emergency wards and an analogous system in the veterinary community.

In almost any scenario involving the use of a bio-weapon, we have the ability to prevent illness and death in all but a small fraction of those infected if and only if we have early warning that epidemic is brewing. Hours matter here. Were there to be let us say dissemination of a few pounds of anthrax from an aerosol device in downtown Washington, tens of thousands of people would become expose to anthrax spores. Most would become ill and most of those would die unless we learned early on of the increase in systems distributed in an oddly shaped area.

So how might this realization come to pass? Well, think about the scenario that I just outlined. A terrorist drives a van down Pennsylvania Avenue at about 8:00 on a Monday morning dispersing an unnoticeable stream of anthrax spores out the tailpipe. Initially nothing happens. People go about their daily activities despite having thousands of anthrax spores in their respiratory systems. By Wednesday morning or early afternoon, due to differences in the dose they received and also the normal biologic variability in the population, a few percent of those exposed, and by the way a few animals as well, will start to get ill with a cough, a fever and lethargy.

What is the likelihood that any of these 100 or 200 people end up seeing the same physician? Well, it's about zero. So 100 or 200 doctors see what appears to be a bad case of flu, shrug their shoulders and draw no systematic lesson.

But let's say that a few of those doctors have at their fingertips an always available easy to use reporting system that demands little of their time and more to the point, doesn't even demand a spe-

cific diagnosis. Instead, the system allows physicians to enter some symptoms as I'll illustrate here.

At the same time as the physicians enter these symptoms, a map will display the existence of the onset of a disease in the local area. Here's an illustration for example, in New Mexico of what this system actually looks like, but I'll use Washington and we'll just zoom in on it to illustrate what I'm talking about. What I'm showing is a zoomable map of the Washington, D.C. area on which physicians and public health authorities can overlay transportation infrastructure, weather, local vegetation coverage, airports, even per capita income to see if the diseases that are being seen are associated with movement of people, might be socioeconomically related.

The CHAIRMAN. How do the diseases get hooked into that?

Dr. ZELICOFF. On this screen that you see here, the physician merely logs in on a touch screen. I'm not sure why your screen's not updating and then within about 30 seconds, can literally enter all of the data that is required. So we're looking at only about a minute of the physician's time.

The public health officials who are also watching this system while not seeing any patients, notice on the map that there's a sudden increase in in this case a flu-like illness in the Capital area. So they call some of the doctors and perhaps learn that some of the chest x-rays on a few of these patients demonstrated a peculiar finding that's not really well-recognized by physicians, but is well known to the public health officials as being strongly associated with anthrax.

An investigation would then immediately ensue rather than five days later when the first deaths would occur and targeted antibiotic therapy could be given. A specific diagnosis would be available in 18 hours rather than five or six days later. But today and let me make this very clear, it's unlikely that local public health officials who are the true experts in infectious disease in their community would know much of anything about severe symptoms in the population until the hospitals were overwhelmed with cases or autopsies revealed the diagnosis in droves.

It would be too late at that point to save the vast majority of people. The reason for all of this is that our current disease reporting system is stuck in the 19th century. It's paper-based, it's disease specific and it's so time consuming as to frustrate even the most well-intentioned of physicians who serve as the true sensors for illness in the community.

I observe this in my practice. Not once in 10 years of practice did I never see a physician report a disease that they were even legally mandated to report by local, state authorities. But there is another way.

In my 10 years of medical practice, not once and I mean never did I see any physician ever pick up the phone, file the fax, fill out the form that is required to report a reportable disease. Now occasionally it does happen, but it is merely a matter of chance and the vast majority of reporting the public health officials have comes not from doctors who are seeing the patients first, but from laboratories.

That would of course assume that a sample was obtained, not a very good assumption in the current economic environment, the

sample was handled correctly and that the result was available in a timely fashion.

The CHAIRMAN. Thank you.

Dr. ZELICOFF. All of those would be very, very bad assumptions on which to base a disease-based surveillance system. In New Mexico and in collaboration with the New Mexico Department of Health, we developed this system that I'm illustrating here which has been in use by 50 physicians for about six months. It's called the Rapid Syndrome Validation Project or RSVP for short.

What we've learned is that physicians actually do take the time, about a minute, out of their busy schedules to consult the system on a daily basis to see what's going on. In other words, to get the epidemiologic or public health lay of the land, and further, that they actually report because they know that they will get an advisory message from the local public health authorities who are watching the data on a near real time basis.

The cost is very inexpensive. It's the cost of the computer, a touch screen and a low speed Internet connection. All of which are ubiquitously available, including in most of the developing world.

The physicians indeed are delighted to have the information. They return the favor by entering suspiciously ill patients and are very, very good at sensing when something is amiss. While the doctor is not necessarily good at making the exact diagnosis of what is wrong when he first sees somebody, she's very, very good at knowing whether or not someone is ill.

I think we've been successful in this approach as the government of Singapore, at least one NATO country and several other public health, state public health authorities around the country have asked for RSVP to be implemented and we are in the process of implementing it in those places now.

Mr. Chairman, when all is said and done would be perpetrators of bio-terror know that the effects of their attacks would be blunted if not eliminated, they might well rethink their strategy of using bio-weapons in the first place.

A multinational cadre of clinicians and nurses exchanging up to the minute information, not delayed by laboratory tests, not delayed by the current existing bureaucracy of reporting is our single best defense and we have the resources now to so equip them both nationally and internationally. All that is required is a policy shift emphasizing and strengthening this linchpin capability.

So I'm looking forward to your insightful questions. I expect that I'll learn much more from you than I've imparted and I apologize for the technical glitch. Thank you.

[The prepared statement of Dr. Zelicoff follows:]

PREPARED STATEMENT OF ALAN P. ZELICOFF

Mr. Chairman and Members of the committee:

It is a high honor to be asked to testify in front of the Senate Foreign Relations Committee. I have followed committee's work for many years, and never thought I'd have the privilege of sitting before you and in such esteemed company. At the same time, I know that I am charged with a profound responsibility: to clearly address the role of foreign policy in strengthening our national security posture with regard to bio-terrorism. My testimony is based on my very best scientific assessment of the technologies currently available, and my admittedly limited understanding of the complexities of international relations. Nonetheless, I believe that there are shared

interests among countries—call it enlightened self-interest—that make possible an immediate substantive improvement in our counter-terrorism strategy.

Mr. Chairman, my formal scientific training is in experimental physics and medicine. I was a practicing internist and immunologist for about 10 years before joining the technical staff at Sandia National Laboratories in the Center for National Security and Arms Control where I am now senior scientist. I work at the interface between politics and technology. I served as technical adviser on the U.S. Delegation to the Biological Weapons Convention (BWC) throughout the 1990s, including the time of the intensive negotiations on a Protocol to strengthen compliance with the treaty. I carry out large scale collaborative research projects in disease outbreak identification with colleagues throughout the Russian biological weapons laboratory system in an effort to better understand that mysterious archipelago of research sites, some or even most of which undoubtedly involved in illegal weapons development throughout the much of the past 30 years. I also develop technology that I believe assists the medical and public health community in identifying disease outbreaks—natural or otherwise—with more day to day utility and in a much shorter time frame than the existing surveillance system. We are testing that technology in the United States and overseas. Interestingly, the contributions of our Russian colleagues has, much to everyone's surprise, been profoundly important in fostering and improving these novel approaches.

My message to the committee is a simple one: we must rethink our approach to the unique challenges of bio-terrorism. The standard tools intelligence and of international diplomacy function poorly in this arena. I am no expert on gathering intelligence, but I am a daily consumer of it, and I believe that peculiar aspects of the bio-weapons craft—small sites, an absence of signatures, ubiquitous availability of organisms—make it awfully difficult for analysts to locate, predict or anticipate an attack except in the most general of terms; the "take" of intelligence is, regrettably, disappointing. Similarly, traditional arms control—declarations, inspection, counting, and compliance judgments—fall flat in adding any substantive strengthening of treaties such as the BWC; quite the contrary in fact, as US tests of proposed verification measures under the recently failed Protocol for the BWC demonstrated rather clearly that most measures were not merely worthless, but actually worse than worthless. They provide data of such ambiguity as to confuse rather than enlighten, and undermine rather than strengthen confidence in compliance with the Convention. UNSCOM activities further underscored the severe limits of intrusive on-site inspections in uncovering even an enormous bioweapons program in Iraq. Thus, the Administration was correct, in my view to reject the BWC monitoring Protocol that was but a rehash of highly fallible verification techniques.

Fortunately, the news here is not all bad. We can address many, perhaps most of our counter-bioterrorism needs through shared interests in the international community in disease-monitoring, biosecurity arrangements and assistance, and at least among our allies, collective preparedness against bio-terrorism. The central and most substantive facet is enhanced disease surveillance, accomplished through an inexpensive, international, secure, Internet-based, system located in primary care clinics and some hospital emergency wards, and an analogous system in the veterinary community.

In almost any scenario involving the use of a bio-weapon, we have the ability to prevent illness and death in all but a small fraction of those infected, if—and only if—we have early warning that an epidemic is brewing. Hours matter. Were there to be, let us say, a dissemination of a few pounds of anthrax from an aerosol device in downtown Washington, tens of thousands of people would be exposed to anthrax spores. Most would become ill, and of those most would die unless we learned early on of an increase in symptoms distributed in an oddly shaped area.

How might this early realization come to pass? Think about the scenario that I just outlined: a terrorist drives a van down Pennsylvania Avenue at about 8 AM on a Monday morning, dispersing an unnoticeable stream of anthrax spores out the tailpipe. Initially, nothing happens. People go about their daily activities despite having thousands of anthrax spores in their respiratory systems. By Wednesday morning or early afternoon—due to differences in dose and biologic variability in the population—a few percent of those exposed (and, by the way, a few animals) start to get ill with a cough, fever, and lethargy. What is the likelihood that any of the one or two hundred people end up visiting the same doctor? It's about zero. So, one or two hundred doctors see a single patient with what appears to be a bad case of flu, shrug their shoulders and draw no systematic lesson.

But let's say a few of those doctors have, at their fingertips, an always-available, easy to use reporting system that demands little of their time and—more to the point—doesn't demand a specific diagnosis. Instead the system allows the physician to report the symptoms of a moderately to severely ill patient, and, at the same

time, shows the doctor and local public health authorities in the District all cases of flu-like illness in the area, presented immediately and conveniently enough on a map. The doctor notices that a few dozen physicians have reported the same thing in just the past few hours. Public health officials who, while not seeing patients are seeing the map on their screens, and to them, the sudden spike in flu-like cases in Zip Code 20501 is unusual. They call some of the doctors, and perhaps learn that the chest X-rays on a couple of the patients demonstrated a finding whose significance was missed by the physicians who have never seen it before, but well known to the public health officials, indicating that these cases might well be anthrax. An investigation immediately ensues, and the diagnosis is confirmed less than 18 hours later. The geographic pattern of illness proves important, and via the media, everyone in the area or a few miles downwind learns of the potential for exposure. Targeted antibiotic therapy is given. A few hundred people die, but had public health officials not suspected anthrax until a few days later, many, many thousands would be dead.

Today, it is unlikely that local public health officials—the true experts in infectious disease in their communities by dint of years of experience and observation—would know much of anything about any severe symptoms in the population until hospitals were overwhelmed with cases or autopsies revealed the diagnosis in droves. By then, it would be too late to save the vast majority of people succumbing to anthrax. Our current disease reporting system is stuck in the 19th century—paper based, disease specific, and so time-consuming as to frustrate even the most well intentioned physicians who serve as the "sensors" for illness in the community. I observed this in my clinical practice: never—not once—did I ever see a colleague report even diseases that they are legally mandated report, let alone a "suspicious" or odd case. But there is another way: in New Mexico, and in dose collaboration with the NM Department of Health, Sandia has developed and implemented a stable, physician-friendly surveillance system called RSVP—the Rapid Syndrome Validation Project. We've had about 50 doctors using the system over the past 6 months. Physicians actually take the time out of their busy schedules to consult the system to "see what is going on" in their communities; public health officials review the data and update advisory messages on a near-real-time basis. The cost is that of a computer, a touch screen, and a low-speed Internet connection—maybe $5–6,000 per clinic serving 5 to 15 doctors. The physicians are delighted to have the information, and return the favor by entering suspiciously ill patients—and they're very good at sensing when something is amiss. And public health officials can quickly analyze the information with geographic tools that are part of the software.

Have we been successful? Practitioners and local health officials seem to think so. We've had requests from dozens of public health jurisdictions around the US to participate in and use RSVP; about two hundred more physicians are about to come onto the system. The Government of Singapore is installing RSVP throughout that island-nation, and other governments have requested the software as well. In the end, the system works because it is in the enlightened self-interest of doctors and epidemiologists to have it; sharing the data makes it that much more valuable as diseases respect no borders. And, this is a "no regrets" approach: even if there is never a bioterrorism attack, the public health benefits will probably be quite large—diagnosis and therapy will be much more accurate than in the current clinical setting, even in the United States where sheer guess work dominates the early treatment of most infectious disease.

Mr. Chairman, the traditional approaches to counter-proliferation of bioweapons—more intelligence spending and arms control treaties—are largely ineffective in this context. It is simply impossible to detect and thwart all individuals or groups that are determined to use an infectious organism or a toxin as a biological weapon of terror. With the anthrax attacks of last year in the Hart building and elsewhere, we now know that at least some terrorists have learned how to prepare anthrax spores in a form that will disseminate easily through the air. Please know this: the challenge to the terrorist never has never been the ability to acquire anthrax spores in varieties that are reproducibly lethal. Rather, the fundamental roadblock to the effective use of bio-weapons was the ability to aerosolize it—that is, to make anthrax particle behave like the air itself—infinitely miscible, invisible and odorless. That this technology, formerly understood by a rare breed of bio-weaponeer that could be found only in the national biological weapons programs, is now in the hands of terrorists is chilling. At the very least it means that future biological weapons attacks are not only probable, but that they are likely to be on a large scale. And, since it is extremely difficult to locate seed stocks, fermenters, and drying equipment necessary to make aerosolize-able anthrax—or, for that matter, infectious, aerosolize-able organisms of many types—we will have to rely on early detection of cases, in hun-tans and in animals, in order to mitigate the worst con-

sequences of a large-scale use of these kinds of bio-weapons. We ignore these conclusions at our peril.

When all is said and done, should would-be perpetrators of bio-terror know that the effects of their attacks would be blunted if not eliminated, they might well rethink their strategy in the first place. A multi-national cadre of clinicians and nurses, exchanging up-to-the-minute information is our single best defense, and we have the resource—now—to so equip them. All that is required is a policy shift emphasizing and strengthening this lynchpin capability.

I am looking forward to the insightful questions of the committee. I expect that I will learn from you much more than I impart.

Thank you Mr. Chairman.

The CHAIRMAN. I doubt that, Doctor. Not the technical glitch, that you'll learn much more at least from me, but what I'm going to do because there's only three of us here and my colleagues—one advantage of being the Chairman is the hearing doesn't start until you get there, but it also doesn't end until you bang the gavel down which means I'm here until the end. So I'd be delighted to yield to my colleagues first.

Senator LUGAR. Well, I thank you very much, Mr. Chairman for your thoughtfulness. Dr. Zelicoff, your presentation is certainly helpful and gives an optimistic sense of, as you say, how to brunt bio-terrorism, given gifted physicians and alert public health professionals.

I just want to underline, without getting into an over-examination of the whole situation, what we've lived through in the wake of the anthrax attack upon Senator Daschle's office and the Senate. The threat was real and the spores present were a problem because people didn't know very much about it.

Dr. Frist fortunately knew a great deal and this was of some comfort to receive some briefings on what was known and what was not known. But what happened fairly quickly, just following your analysis, was everybody went to room S. 216, had a swab test, got three days of Cipro tablets while decisions were made on what to do next.

Senate officials stopped the ventilation system quickly, emptied the buildings, sealed off in a time warp all our records, checkbooks, everything else here; and as a result, probably a lot of lives were saved. Because people knew it was anthrax, they were able to begin treating people who needed treatment. That didn't happen at the Brentwood post office in quite the same fashion; and therefore, as you pointed out, time counts in these situations.

But for the first very public attack, the system responded, because of the ingenuity of people. It was extremely costly; and the taxpayers will be picking up the tab for some time, while trying to figure out all of what happened here.

But in terms of loss of life, identification and accurate diagnosis is imperative if somehow, somewhere in the system somebody picks up a possible threat. Immediate treatment of almost everybody in sight must occur; if so, there's a reasonably good chance of blunting the attack.

This committee, and others, have held hearings exploring the means of dissemination, such as helicopters, trucks, and crop dusters. I agree that identification and response are terribly important, and I'm hopeful this hearing will illuminate these issues for a lot of people.

Dr. ZELICOFF. Two comments if I may, Senator. First, you had a particular advantage in the case of the anthrax letter in Senator Daschle's office in that someone recognized there was powder. Make no mistake, in a large scale bio-terrorism dispersal, you will not have a powder to look at, raise a suspicion, do early swabs and determine who needs to be treated and who doesn't.

Second, even with that advantage, I would hardly call what happened in Washington, D.C. a dramatic success. As a result of a few people being exposed, five people dead, there were several tens of thousands of people put on Ciprofloxacin for at least a period of time. Not exactly our shining hour.

Dr. Ivan Wak, who I believe is the D.C. Public Health Commissioner, at the time of the initial reports asked a question that I think is truly enlightening here. He came out and he specifically asked, tell me, who is it that I do not need to worry about? And no one could give him an answer. Why? Because we had no context, no surveillance system, for example, to know who likely was not exposed.

In the case of a large scale attack where people start to become ill, without this kind of geographic information which is currently not available either to public health officials or to clinicians, that would mean millions of people put on antibiotics. Not only a logistical nightmare, but one that will almost certainly result in untoward side effects that are very unpleasant.

Senator LUGAR. Good point. Mr. Moodie, let me just express, first of all, a personal thanks to you for working with House colleagues on the Nunn-Lugar chemical weapons elimination project at Shchuchye. I want the public to know that through your own quiet diplomacy and credibility you have been most helpful with congressional movement in these important areas.

You have raised a question, all of you have in one form or another, of what an awesome job is still to be done with cooperative Russians. As the Chairman has pointed out, this situation is different than noncooperative Iraqis, but nevertheless there is still much work to do to eliminate this nightmare.

The detritus of the Cold War is a real threat, and it's very expensive to clean up. We discuss the awesome power of these weapons and we know that they're there and the question is just physically is how to pay for it, how to organize the disposal. What would be your advice to the Administration?

At best we're attacking the first of seven locations, the other six are sitting there and hopefully will just sit there for quite a while without deterioration or proliferation. What is a reasonable international program and a dramatic way to sort of get a handle on this while the world is interested in bio-terrorism?

Mr. MOODIE. Thank you very much, Senator, and thank you for your comments. I do think the funding of the Shchuchye facility is an extremely important step forward. It gets activity going on the ground which we've talked about for a decade or more and never saw happen and now finally, we're at the point where some of the Russian stuff is actually going to be destroyed. And that's enormously important and a positive step.

I see a two pronged approach. One is encouraging the Russians to do more themselves. This is their problem first and foremost and

yes, they have committed a significant increase in money, but when you put it against the need, the $120 million a year against the 6 or 8 or $10 billion program isn't a lot. And I do think, despite the economic problems they have, there is more money in the Russian system for this if they want to put it against this rather than some other things and so I think that we should engage with them on that. And by we, I mean in this case the entire international community.

The second track I think is one—we have not pushed this issue as a priority for the last several years in both administrations it seems to me. And as a consequence, we haven't pushed our friends and allies to do as much.

I know in the earlier discussion there was comments about some of things that European allies are doing, the British, the Germans, the Norwegians, but that really isn't a lot of money. The European Union together 15 countries I think has committed less than 20 million euros to this issue. That really isn't adequate. Everybody has an interest in seeing the CW stockpile of the Russians disappear.

It's closer to the Europeans than it is to us. It's closer to Japan than it is to us. And I think what we need to do is make a much more sustained concerted effort with our friends and allies to join us. It probably will mean more money for us, too, but I think if we show that we're willing to put more money into it and we have a cooperative Russian government, they should then be pushed. And I think the place to do this is at the review conference that is scheduled for next year.

I think one objective we should have for that review conference is a strategy that everybody agrees to about how to get the Russians from where they are to where they have to be. This is the single biggest noncompliance issue in the CWC. Not because they're evil people in this case. It's just a huge task.

But they're never going to get to the 2012 deadline and that not only has negative implications for the issue itself, but it has severely negative implications for the health of the treaty, too. For both of those reasons, we've got to work with friends and allies to get them to kick in more money.

Senator LUGAR. I think that's a tremendously important suggestion that the conference offers a focal point. For example, in the discussion of the future of NATO, we're all focusing on Prague and the membership question, the Russian relationship, the war against terrorism, but there's a run up now in this committee with the Administration. We're all talking an agenda that is critically important to achieve.

I haven't heard of anybody working on an agenda for this conference. As you pointed out, the conference provides an opportunity for an international wake up call. All the major parties are going to be there.

It's sort of like a giant pledging conference in an international sense in which we all come to the table to see what is attainable. We need to capitalize on cooperation and expand on addressing these threats. Furthermore, Russia must work with us to address noncooperation in other nations.

There is every reason to want to have an active diplomatic run up to this conference. I appreciate that suggestion. It's one we should follow-up on. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator FRIST. Thank you, Mr. Chairman. Dr. Zelicoff, you said that every moment counts. Why now do you believe that our public health system and physicians are adequately trained today to respond in such a way that is adequate?

Dr. ZELICOFF. By and large my answer is yes. Physicians are very good at recognizing when people are ill, they may not be able to make the correct diagnosis and unlike most physicians, the vast majority of public health officials around the country have actually devoted time to understanding the peculiarities of biological weapons diseases and I think know the earliest indicators of them.

Senator FRIST. And you think—I'm going to ask a whole bunch of questions now.

Dr. ZELICOFF. Sure.

Senator FRIST. Do you think we're going to have a manpower or personpower shortage in terms of trained epidemiologists and people who are experts once you have the technology out there?

Dr. ZELICOFF. Right. I know it's popular to say that we don't have adequate manpower in epidemiology and I would be the last person to question that. What I do think, though, is that in a world of limited resources, when we're faced with a choice between hiring more epidemiologists who have no data at their fingertips versus providing the existing epidemiologists with real time information on which to make decisions, I think the choice is obvious. You go with the latter.

And make no mistake about it, right now epidemiologists learn about disease outbreaks usually as a result of an infection control nurse working in a hospital once enough cases have accumulated or from a laboratory. That is inherently delayed. The system is currently set up almost precisely to be unresponsive enough in the setting of a bio-terrorism attack.

Senator FRIST. If you took all of the public health facilities in the Unites States of America, how many would have the capability to fax, use a fax machine?

Dr. ZELICOFF. It's a lot less than we might want to think. It's probably about 50 or 60 percent are capable of faxing.

Senator FRIST. Just fax machines?

Dr. ZELICOFF. Yeah, just fax machines.

Senator FRIST. Let's take it one step further. In terms of the public health facilities, the first responders, the people we will go to depend upon, obviously you're hitting at the heart of it with your communication, how many have e-mail capability of all the—and that's where we're going to go. That's who we're going to call for early recognition. How many even have e-mail?

Dr. ZELICOFF. I don't know the numbers. What I do know——

Senator FRIST. It's low.

Dr. ZELICOFF [continuing].——what I do know is that in order to provide that kind of capability that provides enough data flow for a system like this one for example, is a low speed Internet connection. We're talking about 50 bucks a month and a computer.

Senator FRIST. But it's not there and I haven't gotten there yet.

Dr. ZELICOFF. They do have phone lines, though. Let's be clear about that.

Senator FRIST. Most of them do have phone lines and capabilities there. The point of the matter is that it is a pencil and paper system and when every moment counts, it's inexcusable today when you've got technology like you have that we don't use blast fax machines which have been around a while, we don't use the Internet, not using the e-mail, don't use Internet, that infrastructure is not there.

I think you made the case and I agree 100 percent this is where we need to be, but it's important for my colleagues to know that the basic support, and it goes back to what Dr. Sands said in one of her recommendations, the basic support for our public health infrastructure we have been remiss.

We have undersupported so even when you introduce your program to a community, they do have the telephone line coming in, but they're not on the Internet and they need to be. And what is hard, I believe, is for us to explain, and we all need to do a better job to communities around the country, that the first responders, the people we're depending upon if every moment counts, to look at that pattern, to communicate from the public health facility to the hospital to the CDC, it's just not there.

It is going to require an increased investment to make your sort of program available. Right now is this in community health centers all across the state?

Dr. ZELICOFF. It's in community health centers in southern Texas and in southern New Mexico. Let me tell you why we picked those community health centers. We tried to pick areas of our part of the country that were most severely underfunded, most severely taxed both in terms of their clinical physicians who are seeing patients and also the public health authorities in those areas and we were able to set this up painlessly even in the poorest part of southern New Mexico and south central Texas along the Mexican border.

So I think the message here is that while I quite agree with you that more resources are needed, let's not make a mountain out of a mole hill. The amount of money that's necessary to accomplish this kind of connectivity which is an 80 percent solution, it's not a 100 percent solution, is trivial. The amount of money that will be required to get the last 10 or 20 percent is of course enormous.

Senator FRIST. But what my colleagues need to understand, the touch screen and the computers available are not in the public health centers today.

Dr. ZELICOFF. Correct.

Senator FRIST. And I'm reinforcing what you're saying, but my colleagues don't realize that when smallpox comes to a community or anthrax is in the community here——

Dr. ZELICOFF. Yes.

Senator FRIST [continuing].——if you're a physician, you haven't been trained to think anthrax, period. That pattern recognition you need to report to somebody so the pattern can be picked up and it becomes even more important—you said anthrax easy. That's easy stuff. We knew the powder was here. You could draw a perimeter around it. You could treat everybody, but what about smallpox which can travel across the country and as a physician if you've

never—you're board certified in internal medicine I see from you bio. Have you seen active smallpox?

Dr. ZELICOFF. No, I haven't even seen a case of measles and I don't think I'd be able to make that diagnosis——

Senator FRIST. No, you wouldn't, but a lot of children get chicken pox——

Dr. ZELICOFF. Right.

Senator FRIST [continuing].——and if smallpox is in your community, the doctors are going to see it and they've not been trained——

Dr. ZELICOFF. Correct.

Senator FRIST [continuing].——to make that diagnosis. Well, if you miss it and every moment does count, right now how infective is smallpox right now? If I had smallpox sitting around me right now to the left and right, people would be infected after about an hour if I had lesions in my mouth. You won't really understand how infective, communicable it actually is.

I just think you presentation and then Dr. Sands, in your testimony, you mention Italy in your written testimony. What if Italy is a site of a small pox attack? We better be planned in some way. Smallpox's germs know no boundaries. They don't care if it's United States, Tennessee, California, New Mexico. Smallpox travels and it travels on an airplane pretty easily and it doesn't have to be at state.

That's why when I ask who has this smallpox—smallpox has killed 500 million people. We've eradicated the disease, but there are a bunch of people running around with the virus in their pocket somewhere and from an intelligence standpoint, we need to figure that out which comes into this whole panel in terms of why we're discussing it.

But going from the front line, we're not trained to recognize smallpox, we don't have the communication to address the smallpox today, so we have a long, long, long way to go.

Dr. ZELICOFF. Right, and let's also add with regard to smallpox and I quite agree with you, it's a highly significant problem that's overlooked because it almost falls into the too hard to do category, that once we have our vaccine supply of 300 million doses, that will not be adequate to solve the problem or address it.

Increasing work in genetic alteration of the organism may in fact result in a vaccine resistant strain. We have to have at least one other tool in our toolbox. There is a small program being run at the CDC with folks from US AMRID to look for antibiotics. They have succeeded in probably coming up with an animal model.

That's an enormous breakthrough because for the first time, we can now test other nontraditional means of treating the disease not only if there's a vaccine resistant strain, but more to the point for the 15 or 20 percent of the population that cannot tolerate the existing vaccine for smallpox because of other conditions.

Senator FRIST. Good. Very well said. Mr. Chairman, I know the time is late.

The CHAIRMAN. No, take your time.

Senator FRIST. I think the real challenge that we need to face and it's so important for this committee to hear this because for the last four years, I've been sort of sitting and listening and our intel-

ligence which we heard from an earlier panel a little bit today, has identified smallpox, anthrax, botulinum toxin, plague, tularemia and the list are there and they're identified, but some way or another our intelligence community isn't filtering down to what you just heard.

Our vulnerabilities are high, they're huge. We can reduce them by responding, but our intelligence community's already identified these, but we're not communicating to the doctors, to the public health communities, to the epidemiologists, to the Appropriations Committee and now we find ourselves with risk. Everybody said the risk is there, it's reality.

Go back to 1995 sarin gas attack, we go back to anthrax right here where we are in New York City where it took six days, the little skin lesion of anthrax took six days to diagnose with the very best doctors, the very best CDC in the world looking at it, it took six days to diagnose it. That's not right today.

The risk we've heard today is there. The risk is increasing. I think that's very important for us to know. Because of technology, because of all the reasons Dr. Sands outlined in her really great paper that she didn't have a chance to go all the way through today and your annotation in the paper, the risk is increasing today.

Dr. Zelicoff, you said it in your opening statement, the vulnerabilities are high, but by reducing the vulnerabilities, we end up reducing the risk. The terrorist wants to terrorize. The terrorist is going to go where the vulnerabilities are high and that's the significance I believe of all the recommendations that are being made today. If we educate people, Bob, if we respond as a government, if we integrate our intelligence, we reduce the vulnerabilities and that reduces the risk as we go forward.

I'll stop with that, Mr. Chairman. I just think it's important, it's really come out in the panel and the earlier panel, this integration, this matrix where we—I'm optimistic. We can lick this thing, but it is going to take this integration that's been demonstrated by the panel today.

Mr. MOODIE. Mr. Chairman, may I make just one quick comment on that.

The CHAIRMAN. Please.

Mr. MOODIE. I think it's particularly important for this committee with the mandate that it has. And that is that as much as we do here at home, that's still not the end of the story. Anthrax doesn't necessarily stop at our border. I think it would be interesting for the committee to examine what other countries are doing with respect to these kinds of issues.

Our institute has done a lot of work in the issue of promoting cooperation in dealing with bio-terrorism internationally. You see a very spotty picture among our Europeans and elsewhere in terms of how serious they take the threat, the kind of money they're putting against it, the kinds of issues they're making, the kinds of medicines they're producing. It's a very mixed picture, and yet we're all going to have to be in this together. We can't do it by ourselves.

The CHAIRMAN. I think that's a valid point and it sure makes you wish for the good old days of the Cold War, doesn't it? You know, then everything was predictable. We knew that the commissars

were not likely to take great risks and they were concerned about controlling all of their potential dangerous substances and God, I never thought I'd look forward to Communist Russia, the Soviet Union again.

By the way, all kidding aside, I think the greatest frustration I've had as Chairman and Ranking Member of this committee is again and I don't know how to say it, I say it ten different ways, is getting to our colleagues and to the administration, past and present.

I have an 86 year old dad who's very ill in the hospital right now, and he is constantly reminding me of two things about first things first and if all is equally important to you, nothing's important to you. It's very hard to get, I think you agree, Senator, get a handle on this and get our colleagues paying attention to it, the administration paying attention.

I mean here we're talking about it again, I'm not criticizing the $8.3 billion we're going to spend this year on national defense. Great. Wonderful. But we're going to spend, what's it up to, $200 million now that we're talking about dealing or maybe $300 million dealing with the whole chemical reduction problem. Dealing with stockpiles of chemical weapons in, you know, in the former Soviet Union, particularly in Russia.

I mean, it seems to me it's so out of whack what we're doing. I mean, Doctor, I would be willing to bet you, on this I may have some disagreement with my friend at least in tone with my friend from Tennessee, if we could somehow get every single state official and every single governor in one room at one moment and give you an hour to lay out your presentation, they could fund all by themselves in their states without a single penny.

I mean if we can wire every single solitary classroom in the state of Delaware, every single classroom from kindergarten through high school is wired now to the Internet. Every singe one in my small state. If we can do that, we can do this in a heartbeat.

Dr. ZELICOFF. Correct.

The CHAIRMAN. We can do this in a heartbeat. And so part of this problem is getting out A, to the public and to put pressure on our colleagues and to our colleagues how serious this problem is and then beginning to move on it. I mean, I can't understand why, to be very blunt with you, why every one of our colleagues aren't here at this hearing.

I'm having trouble getting it and I've been here almost 30 years. Maybe that's why I'm having trouble getting it. But let me point out one of my staff members, actually a fellow that was the science counselor at the U.S. embassy in Tokyo here in the room right now at the time of the sarin gas poisoning in the Tokyo subway, he indicated that a doctor who had dealt with a previously unsolved sarin attack outside of Tokyo faxed his correct diagnosis based on the reports he had heard on the radio and this was critical in saving lives and limiting the deaths to 12 of the 1,000 people who were exposed.

And he said there's real live examples of what you're talking about.

Dr. ZELICOFF. Somebody's going to recognize it. That's correct.

The CHAIRMAN. Real live examples of what you're talking about. I'd like to pursue three things. One with you, Doctor. You indicated the first 80 percent is easy, and the last 20 percent is incredibly expensive. Tell us about the last 20 percent. What does the last 20 percent consist of?

Dr. ZELICOFF. From the standpoint of domestic counterterrorism with biological weapons, it consists of sensor development, consists of education and finally, it consists of integrating a wide and disparate flow of data. Things like pharmaceutical sales, absenteeism from major corporations or from schools on a given day, et cetera. That's all going to be much much harder to do.

The information sometimes is proprietary. More to the point, we don't often know what do so with that information. So those are the things that I'm referring to in terms of domestic activities and that's going to be very expensive.

The CHAIRMAN. I'd ask both you and it's not our practice here to cross-examine our colleagues, but I'd ask him to chime in with you. What are medical schools doing? What are medical schools doing about training students?

I'm a lawyer. Law schools are beginning to shift their focus on how they train lawyers to deal with some of the real and emerging concerns that exist within the law, different emphasis. For example, my law school which is not one of the top 10 law schools, but a very good law school, but no, I mean it's not one of the prestige law schools. I went to Syracuse. It's a very good law school.

My law school now is rated one, two or three in terms of their emphasis on trial practice and clinics and they double the size of the law school just with one thing, providing clinics so that you have students in the community dealing with specific advocacy on specific issues.

Tulane Law School, not one of the top three or five, but a very, very good law school, has probably the single best environment law department in the Unites States of America and has through their law students—I mean, before they even got their degrees, fundamentally altered some of the toxic tort cases that are going on and so much so the Louisiana legislature is considering defunding them. I'm told literally, not figuratively. So what are medical schools doing here?

Senator FRIST. Mr. Chairman, let me just jump in. Because when anthrax hit here and because I knew at that time before New York had been exposed to this, I knew that it took six days for, without going to which patient it was, to make the diagnosis of the anthrax rash and it was interesting.

If you really walk through that, some of it, most of it's been talked about before in the press, but this was with the very best doctors, with the CDC, with the best in transportation and the finest people, you know, a city that is advanced medically, it took six days. That's where we started. So the first letter that I wrote and contact I made as soon as anthrax hit here on October 14th was to the American Association of Medical Colleges and wrote every one of the deans personally myself to basically say, we got work to do. It's not their fault. It's nobody's fault.

The CHAIRMAN. No one's suggesting fault. I didn't mean to imply that.

Senator FRIST. Exactly. But it's very important because as a doctor and I was trained in infectious disease because when I transplant these hearts, the heart transplant's easy, but it's keeping the infections down. So that's what I spent my life doing yet I never had seen, the same question I asked—I was pretty confident you hadn't seen it. I've never seen a picture of the anthrax rash, never had any reason to. Or Ebola or tularemia or smallpox. Yet those are the ones that our intelligence community says we're at risk for today.

So anyway the response was we got together, the deans together within about two weeks and it's sort of working its way through the curriculum. But that was an immediate response. The American Medical College, a group of medical schools, about 125, got together and the response has been pretty good there.

The CHAIRMAN. Yes, Dr. Sands.

Dr. SANDS. I happen to just know a little bit about this because my own Senator has been trying to reach out to the medical community in a variety of ways to try to provide training on the broader context. Obviously we aren't the technical folks, but we know the political context and the history and something about the interest and use and perhaps delivery of some of these weapons.

We have talked to a couple groups and actually put together a proposal that was to fit into curriculum changes that I believe are happening both in medical schools and the schools of public health. The funding that you all have provided is actually making a difference that has gone out to schools of public health to really integrate much more extensively information about the medical and technical components of this concern over biological threats.

I know the American College of, I think it's called the American College of Emergency Practitioners has a task force that they've created and actually done a study on WMD concerns and their major thrust is how to integrate more educational aspects of this concern into their ongoing curriculum both for the, you know, first time you come through the curriculum as well as sort of catching up people who've been the field.

They've at least got a whole set of recommendations that if implemented effectively, will in fact address some of these concerns, but they're just beginning. I mean, but what's nice to see is they are actually moving forward on it and I don't know, Al, you might know more specifically.

Dr. ZELICOFF. Well there's an old saw in medicine, I'm sure Dr. Frist knows it. You see what you know and you know what you see. And if you've never seen a case of smallpox, anthrax, tularemia, botulism, you aren't about to make the diagnosis.

The point is that there's always somebody out there who's seen it, read about it or like Dr. Frist happened to take a personal interest in it and if simply brought into the net, if brought into the web, the diagnosis rapidly emerges.

That's precisely what we're trying to do here and the good news is that most public health officials are not only experts at what goes on in their community on a routine basis, they're smart enough to know when something unusual is happening just by dint of their experience.

The one thing they don't have is the data. And if you make that data available to them, I'm highly confident in the vast majority of circumstances, they will be able to make the diagnosis early and get advice to the physician who has done the report in a timely fashion to not only save that patient, but to anticipate the additional casualties that will be occurring and to prevent them.

The CHAIRMAN. The reason why I asked the question is obvious, but I want to be a little more detailed. I recall how when Senator Frist in a joint meeting that we held because we needed a big room in the Senate dining room when all Senators, all 100, if not 100, 98 were there.

I recall that it was incredibly complicated, but in one sense relatively easy to understand. I've been a great consumer of health care services. I spent seven months in intensive care and/or in an operating room or in a hospital or in recovery with a couple aneurisms, cranial aneurisms and a little embolism in between and I remember the neurosurgeons what they did with me and I mean, I know this sounds strange, but I think it's illustrative of the possibilities here.

Between my first and second aneurism after I got out of the IC unit after 40 days with the embolism, they would literally have their staff at Walter Reed come up, the neurosurgeons, and have me identify, they put angiograms up on a slide for me and had me identify whether or not there was an aneurism or there was not an aneurism to teach me about it, knowing I'd be questioned a lot about this when I left the hospital being a public official and so that I didn't indirectly cause cardiac arrest among their organizational structure for identifying or making statements that were simply not accurate relative to aneurisms.

I remember when Dr. Frist was laying out for us and actually giving us some and the colleagues he had brought along with him, what were the signs, what were the symptoms, what to look for, et cetera, that it struck me at the time, for example, it's the same with doctors, lawyers are required to continue to go to CLS classes, continuing legal services education classes. Once a year you have to show up for that purpose.

I assume there's a same thing in most if not all medical societies in every state. I assume—am I correct in assuming, Dr. Sands, you're talking about the emergency physicians. Is there any discussion that part of the continuing medical education of doctors as they show up that they be educated at least to the four or five or six or three most likely diseases they may encounter that would be the result of a natural spread of the disease or as a consequence of a terrorist taking such action?

Is that being contemplated or is that underway? Again, this is not casting aspersions or blaming anybody. This is all brand new to everybody.

Dr. ZELICOFF. It is. There's one clear piece of evidence for that. This year on the national boards at least in internal medicine, there are four questions about bio-terrorism agents. There are four.

The CHAIRMAN. That's interesting.

Dr. ZELICOFF. The bad news is, to repeat what I said earlier, you can read about measles for months and if you've never seen a case, you're not about to make the diagnosis. The point is that someone

else will almost certainly make the diagnosis of a bio-terrorism related condition outside the clinic where the physician is working even if they've been educated in it.

The CHAIRMAN. Now, one of the things that we've all talked about in this committee because we have particular jurisdiction over it is some of these diseases occur naturally in the environment. For example, the plague. I mean there were two significant cases in India not to long ago. One of the cities was fairly well-educated and responded with serious factual information. One did not.

The damage done varied between the two cities without boring my colleagues with the detail, but the bottom line is that there are a number of places where these disease may in fact occur naturally in the environment, if you will, and they have very little public health infrastructure.

We talk about it with regard to dealing with AIDS which is a different subject. I'm not suggesting it's the same at all. In Africa, an area that Dr. Frist and Senator Feingold and others have spent a lot of time focusing on and we have an attempt here to try to provide through our foreign assistance budgets the ability of these public health organizations or the lack thereof in these countries, assistance.

The thing that I wonder about as a practitioner without any, not a medical practitioner, a political practitioner of this trade figuring out how to deal with aid to other countries is these programs tend to work that we fund if they're models that are actually able to be picked up by countries that lack this infrastructure or lack expertise.

I guess the question that I have if anyone wishes to respond to it, they may or come back in writing or pursue it in another forum, is what models are there available for helping countries, Third World countries in particular.

I'm not in anyway, Mr. Moodie, suggesting the Europeans need not pay more attention where they have the capability, but in those countries where they do not have much of a public health infrastructure, are there models or are there means by which we can disseminate information and financial resources to help them? Because, you know, if Ebola breaks out in a country, if smallpox were to break out, intended or unintended, which is highly unlikely to be unintended right now.

As you said, an airplane's a hell of an incubator and it sure can travel long distances. What should we be doing, this committee, this Congress, this government to deal with that dilemma?

Mr. MOODIE. Senator, I think that first of all, it's a huge task because there is such an inadequacy in terms of infrastructure in so many parts of the world. So it comes back to the point you were making before about setting priorities. I think both Amy and Al in their way have stressed what should be the starting point which is disease surveillance capabilities. The ability to identify, report and understand has got to be the starting point for doing that.

At the moment, globally, there are a lot of things going on, whether they're under the auspices of the World Health Organization or private surveillance activities, PROMED for example, a number of other things. But there's nothing that brings these things together. There's nothing that makes it a strategically coher-

ent approach to this, and there are places still where it doesn't happen.

So while there are other aspects of public health in parts of the world that also have to be pursued in terms of capabilities on the ground, I think that the first place to begin is by emphasizing the surveillance issue, in part because it serves a dual purpose.

One is that it will help us deal with issues of emerging and reemerging infectious diseases. Second, a better global disease surveillance and reporting system might also be helpful in distinguishing between a naturally occurring, although unusual outbreak, and in fact a deliberate attack.

I know that is a very difficult thing to do. But, over time, with a developing system, we at least are moving in that direction where nothing exists today. So I think it's a huge task, but in terms of setting priorities my own would be to focus initially on disease surveillance and reporting and to move forward on a global basis working with a number of pieces that are already in place as the foundations on which to build, to bring together and to move forward.

Dr. ZELICOFF. If I can build on what Mike just said. I think also we have to do disease surveillance in a different way than we've done it in the past. Our emphasis has always been on spreading laboratory equipment around and then using that laboratory equipment to make disease specific diagnoses.

That's scientifically the nice way to go. It's also by far the single most expensive way to go. Instead, a surveillance system that focuses not on requiring a laboratory based diagnosis but the physician's suspicion of unusual signs and symptoms associated with geographic information like this goes a long way, goes 80 percent of the way to making the diagnosis.

To put it another way, I don't think in a world of limited resources we need more laboratory equipment sprinkled around the world. We need much more intelligent use of the laboratory resources we currently have and testing thousands of people for anthrax when a few people have been exposed is an example of exactly what not to do.

Mr. MOODIE. I think part of it also has to do with changing government attitudes. One of the reasons the plague in India had the impact that it did was the hesitance on the part of the Indian government to acknowledge it, to get the resources in. That is a political issue, and there are a lot of political sensitivities about the way the WHO does it's work as an international organization which I'm sure you all know much better than I do. Part of this also has to be changed in government attitudes towards the importance of disease surveillance, getting the information out where it's needed so that people can deal with it in a way to deal with the problem.

The CHAIRMAN. We see that in Africa with AIDS.

Mr. MOODIE. Absolutely.

The CHAIRMAN. Sure.

Mr. MOODIE. And I think that's got to be part of the campaign in addition to getting the kinds of equipment on the ground that will help move things forward.

Dr. SANDS. Senator, just one other additional comment to add to what my two colleagues have already said. I mean, I think it would

be useful to actually review what infrastructure might exist in, you know, around the world in different regions.

For example, I'm aware of the fact that under the Soviet system there was a rather extensive system of what we'll call the anti-plague institutes that did in fact disease monitoring for the reasons, I mean, in part because of BW program, I think they were trying to sort of be ahead of that one for themselves, but have especially in central Asia I think fallen sort into disarray. But they have a very rich history and they know their communities. They could be the basis of a capability in central Asia which would be a critical area I think to be able to get more data out of and it could be a model for other areas.

Senator FRIST. Mr. Chairman, this is a fascinating discussion. About a year and a half ago after looking at what was done for our public health system here, which Dr. Zelicoff hit right on the head, underinvested, no infrastructure out there, easy to do, we just got to do it.

Then we went and I and several other people requested from the GAO a report just on this. I was interested internationally because now we know germs have no borders, what we've heard all day which is obvious, but it's not obvious to the way we've traditionally looked at things.

We looked at what we have in public health here, inadequate, underinvested in the past and we asked for a GAO report about a year, I think it was last fall, and it was called Challenges in Improving Infectious Disease Surveillance Systems.

It concluded, this GAO report and we can share it with everybody, it concluded that global disease surveillance especially in developing countries is woefully inadequate to provide advance warning about newly emerged diseases including things like antibiotic resistant tuberculosis or the suspected use and testing of dangerous organisms as bio-weapons.

We got most of the information there. Dr. Sands, I think we need to update it as we go forward. And I think your bill, Mr. Chairman, is on this Global Pathogen Surveillance Act this year, you know, by the time we finish that, I think we can make a great bill which addresses just this.

One final comment. You mentioned the plague and in our list that I keep kind of spewing out and Dr. Zelicoff mentioned because that's not the focus of this hearing, but things like Ebola we don't know anything about. We don't know why Ebola occurs. We don't know why it reoccurs. About 30 or 40 cases in East Africa the other day, central East Africa, we have no idea really.

Now, the good news, the NIH right now announced four days ago that they're developing a vaccine against Ecola, but it's again matching how little we know with the intelligence with the response whether it's NIH or CDC as we go forward.

You mentioned the plague and in passing, Dr. Moodie mentioned it. What happened there was panic, was surge capacity, overwhelming the system, lack of trust of government, people leaving, fleeing the city. This is one of the two cases that you mentioned. This isn't ancient history, this is recently. And that was a good point.

It's the exact same thing that happened at an exercise that we in part funded, a public/private partnership called Top Off and it was at the Denver Performing Arts, it was an exercise, everybody's heard about it. But that was the same plague that you referred to. It's the same little entity, little micro-organism and there we found that through this exercise of using the very best of what we had in 2000, 2001 and using this model, we had 950 people to 2,000 people dead after just a few weeks, 4,000 people in hospitals and mass panic, distrust of government, breakdown of civil institutions.

I say all this because what you mentioned recently with the plague internationally is exactly what we through our best modeling have demonstrated what happened here, all of which we can fix. We can reduce these vulnerabilities by engaging the sort of legislation you put forward, support of our public health infrastructure, adopting programs like we've been introduced to today in terms communication among health officials as we go forward.

Dr. ZELICOFF. And we know that that works. New Mexico, my home state, is the land of the flea and the home of the plague. Yet, there's never panic when we have plague cases and we have half a dozen a year. Why is that? It's because we're easily able to share our expertise on that one illness between the public health department and local clinicians.

So when a plague case is announced as it will be announced this fall, it happens ever year, there's never panic in New Mexico simply because we have experience in dealing with it and that can be shared through systems like this.

Mr. MOODIE. I also think it underlines the need to be sensitive to the whole range of potential problems here. I'm a little bit concerned that because of our recent experience and because of the potential implications of it, we've become mesmerized with anthrax and smallpox and that's it. That's where our attention is, that's where the money's going, that's where the medicines are going, the stockpiles are dealing with that. But we've got plague, tularemia and who knows what else; water born pathogens of various kinds that nobody ever talks about; for example, cryptosporidium and a variety of other things.

It seems to me we are going to do ourselves a disservice. The agent is part of the risk that we have, but the threat is constituted by how that agent interacts with who have it, how they're going to use it, against what kinds of targets. So I think that, as we move forward on this, we just can't be mesmerized by the immediate event of the day, but recognize the range of potential dangers here is much greater than it has been suggested. We've got to find ways of dealing with that whole range. Today, things like surveillance can't do it. They are the ones that are going to make the distinctions to allow us to react appropriately to the range of agents that potentially exists.

The CHAIRMAN. Quite frankly, it seems to me this is probably the biggest bang for the buck. I mean the ancillary benefits that flow from this kind of initiative in the broader scale are so profound and so welcome and so beneficial in terms of bang for the buck, it seems to me that this is the ultimate win/win initiative we could have.

I've trespassed on your time much too much. I'm going to ask a number of questions particularly to you, Mr. Moodie and you, Dr. Sands, about what we didn't get into at all. The only place I do have any expertise and that is the arms control side of this agenda which is we're in a new age, a new time and in a sense to be overly simplistic, but we need a new arms control. We need a new way to deal with arms control.

It's not the only tool, but it's an important tool here and I may ask you to consider whether or not you would be willing to come back at another time and also whether you would entertain my staff out in Monterey to go into much more detail with you. I know they'd hate to be sent there. I don't why anybody would ever leave Monterey.

But any rate, for example, there's a need for new thinking you point out, Mr. Moodie, but we need some specifics about again something I've spent a lot of time thinking about. I'm not sure I'm right but, you know, the issue that you point out that how do we deal with Biological Weapons Convention challenge with those who are cheating and those who are not parties?

There's a distinction there and as you recall, because I've been doing the arms control beat for so long on other issues, you now, the great complaint that began to be mouthed by people like the former Secretary of Energy.

Dr. ZELICOFF. Slesinger?

The CHAIRMAN. Slesinger was that the Atoms for Peace program, the IEA, were counterproductive in that they spread knowledge rather than contained it. Well, you point out this issue of maybe we separate this notion of access limitation of a capability and aid, that to join a treaty to gain access may be counterproductive for our interests.

And I think it's an entire area we have to explore that we haven't paid much attention to. And so I really think your contribution, Dr. Sands, about you know re-examining the assumptions is probably the most useful way to begin a lot of this discussion.

But I'd like to conclude by again, I've taken so much of your time. As you can tell, my interest is almost unending on this subject, but the thing I want to thank the three of you for is for having taken this so seriously, taking your invitation to come before this committee as serious as you have.

It's obvious from your presentations that you took it very seriously and I just want you to know the committee and I in particular and you could tell by the questions here, we take your input very, very seriously. And it's a little big like, you know, when you sign up and you make a—I could never understand why I thought it was just purely out a noble instinct why occasionally very wealthy individuals contributing to a charity wanted to make their contribution anonymous.

I now understand why and that is they get called on repeatedly once their name gets put on the list and maybe even sold, which is another privacy issue we have to talk about, but any rate, I unfortunately for you all your contributions are taken seriously.

You're about to be put on the list, if you will. I suspect you'll get a lot more requests for your input and I want to repeat, Mr. Moodie, what the guy whose been the leader in dealing with the

proliferation issue, nonproliferation I guess is more accurate than proliferation issue, Senator Lugar has said.

Your help on the House side was invaluable. You've kicked the can. You've helped us kick up the visibility here. As you recall a couple years ago, there was talking about zeroing out most of these initiatives. It's still woefully inadequate, but it's at least four to six times what it was likely to have been and it's in large part due to your help and we appreciate it very, very much.

In truth, I would suggest that it's ultimately because of Senator Lugar—when the administration testified before this committee with their budget request, they expected to get a hard time from me, but I don't think they expected as blunt and as straightforward, although he would never characterize it this way, as threatening a response as they got from Senator Lugar.

So maybe together we can continue to make some progress here. And I thank you all for your input here and assure you we'll be asking each of you again hopefully in the not too distance future for additional help and maybe ways in which we can help implement some of what you're suggesting, Doctor, with regard to allowing public health officials to have access to this additional information which seems to me to be, although very difficult to put together, an alarmingly simple and cost-effective way to help us make progress here.

Dr. ZELICOFF. Thank you.

The CHAIRMAN. I am absolutely convinced that the American people are fully capable of dealing with anything that they face given sufficient information, given sufficient honest input, there's not much we can't handle and so I thank you all for your input.

If anyone would like to make a closing comment, I'd welcome it. Not required. By the way, the entirety of each of your statements will be placed in the record and as a friend and I'm going to take the time to see that each of my colleagues are not mailed the whole transcript because they'll never read that nor do they have time. There's no possibility.

It's interesting, up here we're, as should be expected by our constituents, to be experts in everything from weapons of mass destruction to HCVA, from the Corps of Engineers to education and it's not possible. I think your three individual submitted statements for the record are worth reading for my colleagues and so I'm going to make sure they get copies of it.

Mr. ZELICOFF. I have one closing thought. What I've just heard you say is that investments in public health are really a no regrets philosophy. Good counterterrorism is in fact good public health and even if there is never a terrorist attack on a large scale—and let's hope there isn't—the public health system will benefit and that will improve the rational care of medical care in the Unites States.

The CHAIRMAN. I just think the benefits are so—I mean, like you said, if there's not ever a single solitary additional effort to use any pathogen or disease as a weapon or I mean, we need this, period.

For example, when I talk about the need to improve our safety and surveillance capabilities with regard to targets, different issue, the actual specific targets that terrorists may use, people look at me because I fixate on the rail system which is so vulnerable. And I point out to everybody the City of Baltimore shut down for the

better part of a week because there was a fire in a tunnel. A fire. A fire. Nothing more. An accidental fire in a tunnel.

And so when my colleagues point out to me that, you know, I may be wrong about a terrorist attack occurring in whatever form in one of the tunnels on the system, I point out to them that it's a good thing to modernize the tunnel, period, unrelated to whether or not there is a terrorist attack. It's a good thing to modernize, bring into the 21st century our public health system just in terms of connectivity, as they say in the ads, even if there weren't any threat of terrorism.

Mr. MOODIE. Mr. Chairman, if I might make just the last comment on your remarks about where do we go in arms control. Our institute actually right now is engaged in a study that's focusing on exactly that, and we hope to have recommendations well before the resumption of the review conference in November. We would very much welcome your personal participation and that of your staff, not only in terms of the finished recommendations, but also in the process of getting us there. We'd welcome that support and very much look forward to it. Thank you.

The CHAIRMAN. We are like poor relatives. We show up when we're invited. So I thank you all very, very much. We are adjourned.

[Whereupon, at 1:38 p.m. the hearing was adjourned.]

STATEMENT SUBMITTED FOR THE RECORD BY SENATOR RUSSELL D. FEINGOLD

Mr. Chairman, thank you for calling this important hearing. I am grateful for the opportunity this hearing provides to discuss the threats caused by chemical and biological weapons. This is a serious threat that cannot be ignored. Indeed, I believe the anthrax attacks on the United States last fall startled all of us. They demonstrated that biological weapons can be delivered with relative ease, resulting in widespread fear and confusion. And while the loss of life in those attacks was itself a terrible tragedy, I think many of us were also surprised by the level of disruption caused by the subsequent clean-up operations. The attack here on the Capitol closed a large public office building for months, requiring extensive remediation efforts at significant taxpayer expense. It is clear today that these weapons pose a significant threat to both our civilian population and to our civilian infrastructure.

We must act forcefully to respond to these threats. But to respond effectively, we must first understand the nature of the threat, and we must do a better job of monitoring the materials that can be used to make these weapons. If we have had a difficult time in keeping track of some of our own biological materials here in the United States, we can imagine that the breakup of the former Soviet Union created an unprecedented opportunity for terrorists and rogue states alike to acquire chemical and biological materials and technologies. The challenge now is to create the right balance of incentives and mandates to convince all states to adhere to the international regimes that have been created to control the proliferation of chemical and biological weapons materials. I trust this hearing today will begin to explore the contours of a robust and ultimately more effective international regime to reduce the threats posed by chemical and biological weapons.

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