PROLIFERATION: THREAT AND RESPONSE

January 2001

Office of the Secretary of Defense

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Message of the Secretary of Defense

At the dawn of the 21st Century, the United States now faces what could be called a Superpower Paradox. Our unrivaled supremacy in the conventional military arena is prompting adversaries to seek unconventional, asymmetric means to strike what they perceive as our Achilles heel.

At least 25 countries now possess — or are in the process of acquiring and developing — capabilities to inflict mass casualties and destruction: nuclear, biological and chemical (NBC) weapons or the means to deliver them. For example:

- North Korea is building and selling long-range missiles, has chemical and biological warfare capabilities, and may have diverted fissile material for nuclear weaponry.
- Iran, with foreign assistance, is buying and developing longer-range missiles, already has chemical weapons, and is seeking nuclear and biological capabilities.
- Iraq — which prior to the 1991 Gulf War had developed chemical and biological weapons and associated delivery means, and was close to a nuclear capability — may have reconstituted these efforts since the departure of UN inspectors from Iraq in late 1998.
- Libya has chemical capabilities and is trying to buy long-range missiles.

Also looming on the horizon is the prospect that these terror weapons will increasingly find their way into the hands of individuals and groups of fanatical terrorists or self-proclaimed apocalyptic prophets. The followers of Usama bin Laden have, in fact, already trained with toxic chemicals.

Fears for the future are not hyperbole. Indeed, past may be prologue. Iraq has used chemical weapons against Iran and its own people. Those behind the 1993 World Trade Center bombing also were gathering the ingredients for a chemical weapon that could have killed thousands here in the United States.

I have been concerned about the security threats posed by proliferation from the day I took office as Secretary of Defense. Completely halting proliferation is not possible, but stemming it is both vitally important and achievable. To that end, the Department of Defense (DoD) is playing an active role in technology transfer and export controls and in the implementation of arms control and nonproliferation regimes. DoD is participating in the on-going effort to improve transparency under the Biological and Toxin Weapons Convention. Through the Defense Threat Reduction Agency, DoD is implementing inspection and monitoring requirements of several U.S. treaties. And under the Cooperative Threat Reduction Program, DoD is assisting the states of the Former Soviet Union in preventing the further proliferation of NBC knowledge and capabilities.

However, recognizing that proliferation has and will occur, it is also essential that we do our utmost to provide protection for our forces overseas, and indeed, to take steps to mitigate the consequences of a terrorist act using such weapons here at home. I strongly believe that preparation is itself a deterrent. That is why I directed in the 1997 Quadrennial Defense Review that an additional billion dollars be added over the subsequent five years to the Department of Defense Counterproliferation Initiative. Through this effort, we are making important strides in improving the preparedness of our troops to operate effectively despite the threat or use of NBC weapons by an adversary:

- Combatant commanders have adapted plans to account for the threat or use of such weapons.
- Efforts continue to further enhance the full range of theater missile defense systems.
- Significant strides have been made in developing and fielding improved chemical and biological (CB) detection and protection equipment.
- Military commanders are adapting training standards, doctrine and concepts of operations to ensure the readiness of U.S. forces to carry out their missions under chemical and biological weapons conditions.

Enhancing the capabilities of our Allies and international partners is also an integral part of this Initiative. We have a mature effort underway within the NATO Alliance, and a number of bilateral activities with specific NATO allies. We also have initiated programs with friends and allies in Asia and in the Middle East, including the Cooperative Defense Initiative with Persian Gulf states.

At the same time, as part of a federal interagency effort, the Defense Department is doing its part to assist and advise cities and communities across the nation in coping with the catastrophic consequences of an attack that unleashes these horrific weapons on U.S. soil.

This new edition of *Proliferation: Threat and Response* — the second since I became Secretary of Defense — updates information about the nature of the proliferation problem and describes the policies and programs the Defense Department is carrying out to counter this growing threat to American citizens, armed forces, and allies. The race is on between our preparations and those of our adversaries. There is not a moment to lose.

Table Of Contents

Contents (Continued)

Contents (Continued)

ANNEXES

GRAPHICS AND TABLES

Contents (Continued)

INTRODUCTION

In virtually every corner of the globe, the United States and its allies face a growing threat from the proliferation and possible use of nuclear, biological, and chemical (NBC) weapons and their delivery systems. In some cases, our chief concern is indigenous weapons development programs, in others it is transfer of hardware or know-how across international borders. Broadly, however, we have become increasingly concerned in recent years that NBC weapons, delivery systems, and technology may all be "for sale" to the highest bidder. In Northeast Asia, North Korea's extensive NBC weapons program threatens Japan, South Korea, and U.S. forces and interests in the region. In North Africa and the Middle East, states of proliferation concern — Libya, Syria, Iran, and Iraq — remain poised to develop and use all means at their disposal to threaten U.S. and allied interests in the region and beyond.

U.S. conventional military superiority paradoxically creates an incentive for adversary states to acquire NBC weapons. Because our potential adversaries know that they cannot win a conventional war against us, they are more likely to try asymmetric methods such as employing biological or chemical weapons or threatening the use of nuclear weapons. This strategy also applies to particular terrorist groups intent on inflicting a large number of casualties or causing panic, if such groups judge that conventional means are inadequate and they do not fear political or military retaliation.

The Quadrennial Defense Review (QDR), the Department of Defense's (DoD) most recent strategic-level defense review, published in May 1997, concluded that the threat or use of chemical or biological weapons is a likely condition of future warfare and could occur in the very early stages of war to disrupt U.S. military operations and deployments of men and supplies into theater.

The QDR also observed that DoD had made substantial progress in preparing to deal with an adversary's use of NBC weapons. Nevertheless, it underscored two key challenges that DoD must meet to ensure future preparedness. The first challenge is to institutionalize counterproliferation as an organizing principle in every facet of military activity planning, equipment, concepts, and training to ensure our forces can prevail against NBC — armed adversaries. The second is to internationalize our efforts to encourage allies and coalition partners to likewise train, equip, and prepare their forces to operate under chemical or biological weapons (CBW) conditions.

The publication serves as a multi-faceted tool for decision-making by providing background on the threat and U.S. progress toward countering that threat. The first section of this report details the proliferation of NBC weapons and their delivery systems and the threat they pose to U.S. and allied forces and U.S. interest abroad. The second section of the report describes the DoD coordinated, comprehensive strategy to combat the international threats posed by the proliferation and possible use of NBC weapons and their delivery systems.

SECTION I — NBC PROLIFERATION CHALLENGES

Threats from the proliferation of nuclear, biological and chemical (NBC) weapons and missiles come from states and non-state groups, such as terrorists. Key states of proliferation concern are continuing to try to acquire and develop these dangerous weapons, while some terrorist groups are showing increasing interest in them. The growing availability of NBC- and missile-related technologies and expertise and the sophistication of some of these technologies also highlight the threat. In addition, NBC weapons increasingly are viewed as asymmetric means to counter the West's superior conventional military capabilities.

Russia and China are capable of directly threatening the continental United States and both continue strategic modernization programs. Moreover, U.S. forces and interests are threatened by states of proliferation concern, because of ongoing NBC weapons and missile acquisition and their development efforts. For example, the U.S. government is concerned that North Korea may have enough plutonium for at least one nuclear weapon. In addition, about a dozen states, including several hostile to the West, are actively pursuing offensive biological and chemical warfare capabilities. Lastly, while the number of states with ballistic missiles has declined with the elimination of some missile programs in Eastern Europe, over 25 countries still have these missiles available.

Moreover, the relative ease of producing some chemical or biological agents has increased concern that use of chemical or biological weapons may become more attractive to terrorist groups intent on causing panic or inflicting large numbers of casualties. For example, the reported interest of Usama Bin Laden's network in NBC materials is a key concern in terms of possible future threats to U.S. interests.

New Suppliers

In recent years, a new proliferation dynamic has developed, with the greater availability of components, technologies, expertise, and information. This availability stems from the willingness of various state suppliers, or companies within those states, to sell such materials, and a veritable information explosion from academic and commercial sources, or the Internet. It also may be fueled by weakened security at some key NBC-related facilities in the former Soviet Union (FSU), the search for employment by unemployed scientists and technicians associated with active or formerly active Soviet programs, and the transfer or sharing of technology among states trying to develop programs.

Entities in Russia and China are the main suppliers of NBC- and missile-related equipment and technologies, especially to states of proliferation concern. In the last several years, Russian entities have exported ballistic missile and nuclear technology to Iran, and Russia also remains a potential source of biological and chemical warfare expertise. China continues to be a source of missile-related technology. Lastly, North Korea is a key source for ballistic missiles and related components and materials.

The Russian government is committed to the security of nuclear weapons and weapons-useable nuclear materials, but continuing turmoil in society, corruption, and resource shortages complicate the ability of the Russian government to safeguard these materials. The combination of lax security for nuclear materials, poor economic conditions, and the growing power of organized crime in Russia mean that the potential for the theft and subsequent smuggling of these materials will continue. This concern also extends to facilities in the FSU that house chemical or biological warfare-related materials. Further, numerous scientists and technicians previously involved in key programs face severe salary reductions or loss of employment, and they could be the target of recruitment efforts by states or non-state groups trying to establish their own weapons capabilities.

Foreign assistance, particularly from Russia, China and North Korea, continues to have demonstrable effects on missile advances around the world. Moreover, some countries that have traditionally been recipients of foreign missile technology are becoming suppliers and are pursuing cooperative missile ventures.

Improved Weapons

There is a growing potential for the production of new and more complex chemical and biological agents, which are more challenging for defense measures and medical treatment. While most of these agents exist only in the laboratory, their continued development raises the possibility of their acquisition by states of proliferation concern.

Biological agent development is particularly troubling because virtually all the equipment, technology, and materials needed for biological warfare agent research and development and production are dual use. Thus, biological weapons applications are relatively easy to disguise within the larger body of legitimate commercial activity, as no specialized facilities are required. Any country with the political will and a competent scientific base can produce toxins or infectious agents, which include viruses, bacteria, and rickettsiae.

Preparation and effective use of biological agents as weapons is more difficult, at least with respect to non-state actors, than popular literature may suggest. However, even the threat of use of biological agents with crude delivery systems could have significant operational repercussions for military forces. In addition, genetic engineering is one of a growing number of biotechnologies that could allow countries to develop agents, such as modified viruses, that would make detection and diagnosis difficult and that could defeat current protection and treatments.

There has been a great deal of publicity about Russian development of a new generation chemical warfare nerve agents, some of which are referred to as "Novichoks." These agents reportedly were designed to defeat Western detection and protection measures, and their production can be hidden within commercial chemical plants. There is additional concern that the technology to produce these compounds might be acquired by other countries, amplifying the threat.

In the area of ballistic missiles, several regional states are shifting emphasis from short-range to medium-range, and in some cases longer range missiles. In addition, some of these countries may decide to deploy their newly developed missiles with only a minimum of testing, substantially reducing our warning time and accelerating missile deployment. Because of their longer range, these newer missiles may be able to threaten additional deployed U.S. and allied forces.

Moreover, cruise missiles and other unmanned aerial vehicles are well-suited for the delivery of NBC weapons because of their and potential effectiveness for disseminating chemical or biological agent over a wide area. While Russia now has the ability to deliver a nuclear warhead with its long-range land attack cruise missiles, most other states of proliferation concern have only short-range cruise missiles and other unmanned vehicles that are designed for an anti-ship role. However, some of these states could attempt to modify the missiles to deliver an NBC warhead in the future. Lastly, there are other widely available potential means of delivery for these weapons, including artillery, multiple rocket launchers, mortars, fixed wing aircraft, helicopters and unmanned aerial vehicles (UAVs). Aerial sprayers also can be adapted for use with many types of helicopters, UAVs, and aircraft.

NBC Use and Asymmetric Military Strategies

Asymmetric warfare — that is, countering an adversary's strengths by focusing on its weaknesses — is not a new concept. Because of U.S. and allied conventional force superiority, some states may see asymmetric strategies, such as the employment of biological or chemical agents, as a means of avoiding direct engagements with dominant U.S. conventional forces and a way to "level the playing field." This strategy also applies to particular terrorist groups intent on inflicting a large number of casualties or causing panic, if such groups judge that conventional means are inadequate and they do not fear political or military retaliation.

THE MIDDLE EAST AND AFRICA

U.S. Goals and Interests

U.S. goals in the Middle East and Africa include securing a just, lasting, and comprehensive peace between Israel and all Arab parties; maintaining a steadfast commitment to Israel's security and well-being; building and maintaining security arrangements that assure the stability of the Gulf region and unimpeded commercial access to its petroleum reserves; combating terrorism; ensuring fair access for American business to commercial opportunities in the region; and promoting more open political and economic systems and respect for human rights and the rule of law. In this volatile region, the proliferation of NBC weapons and the means of delivering them poses a significant challenge to the ability of the United States to achieve these goals. Iran, Iraq, Libya, and Syria, which are aggressively seeking these capabilities and increased missile capabilities, constitute the most pressing threats to regional stability.

Iran is actively attempting to acquire or produce a full range of NBC weapons and missiles. The United States believes Iran is committed to acquiring nuclear weapons, either through indigenous development or by covertly acquiring enough fissile material to produce them. During the Iran-Iraq War, Tehran initiated biological and chemical weapons programs, in direct response to Iraq's use of chemical weapons. In addition, Iran is expanding its ballistic missile programs.

Iraq has long had NBC weapons and missile efforts. The challenges these weapons pose in time of conflict became clear during the Gulf War (Operation Desert Storm), when the United States and allied forces had to deal with real and potential complications posed be Iraq's arsenal of NBC weapons and missiles. When Iraq invaded Kuwait in 1990, it had a known chemical warfare capability and a demonstrated willingness to use it (Iraq used chemical weapons against Iranian troops and its Kurdish population during the 1980s) a suspected biological warfare capability, and an ongoing nuclear weapons development program that progressed despite the range of international export controls and inspection activities undertaken by the IAEA. As a result of post-war UN inspection efforts, the true dimensions and level of development in these programs became much clearer and more evident. As efforts to renew UN inspections in Iraq continue, the international community continues to maintain sanctions on Iraq, which shows no let up in its pursuit to reconstitute its pre-war weapons and missile capabilities.

Iran and Iraq have each demonstrated their intent to dominate the Gulf and to control access to critical oil supplies. In their pursuit of regional hegemony, Iran and Iraq regard NBC weapons and missiles as critical to their defense against each other and necessary to support their overall political and military objectives. Possession of nuclear weapons would likely lead to increased intimidation of their Gulf neighbors, as well as increased willingness to confront the United States.

Libya remains a significant proliferation concern. Libyan leader Muammar Qadhafi has shown that he is willing and capable of using chemical weapons and missiles against his enemies. Libya sees the United States as its primary external threat, owing to unrelenting United States opposition to Libya's support for terrorism, NBC programs, and aggressive behavior. Although Libya's capabilities to use chemical agents and missiles are limited, Qadhafi remains undaunted in his pursuit of such capabilities and might not hesitate to provide forms of these weapons to states or terrorist groups he supports and which support him in return.

Syria possesses a substantial force of ballistic missiles capable of reaching targets throughout Israel and has an active chemical weapons program. Syria views Israel as its primary external threat and sees its chemical weapons and ballistic missiles as means to counter Israel's qualitative superiority.

The U.S. defense commitments, military presence, and demonstrated ability to defend our own and allied interests against such threats are vital to achieving our goals in the region.

Capabilities, Intentions, and Trends

The pace of acquisition and development efforts for NBC weapons and missiles in the volatile regions of the Middle East and Africa has remained steady during the last several years. This is dangerous because of the long history of conflict that characterizes the region. Although there has been progress in the process towards a comprehensive settlement of the Arab-Israeli dispute, other dangerous trends remain. For example, some states are focused on producing their own chemical and biological agents and ballistic missiles, seeking to become independent from foreign suppliers. As these states achieve production self-sufficiency, they, in turn, may become suppliers of NBC weapons or missiles, or related technologies, decreasing opportunities to restrain proliferation and complicates nonproliferation diplomacy. There also is a trend towards developing more advanced chemical agents and longer-range missiles, increasing the risk to U.S. and allied forces deployed to the region. Iran especially has demonstrated a commitment to developing long-range ballistic missiles, which can reach deep into neighboring countries and to Israel.

Over the last few years, several states have made significant progress producing their own weapons, including Iran, a development which could result in a greater number of suppliers, and thus increase proliferation in the future. In the absence of effective UN inspections and monitoring since 1999, Iraq may have begun to reconstitute the programs it had prior to Operation Desert Storm. Meanwhile, Syria may have begun to develop the persistent nerve agent VX to add to its existing stockpile of sarin. In Africa, with the suspension of UN sanctions against Libya, Qadhafi may be intensifying procurement efforts, and Sudan has shown a growing interest in chemical warfare.

IRAN

Objectives, Strategies, and Resources

Iran's national security efforts are designed to increase its influence and prestige in the Middle East and throughout the Islamic world, to deter Iraq or any other regional threats as well as to limit U.S. influence and presence in the region, especially in the Persian Gulf. Iran recognizes that it cannot match U.S. military power and therefore seeks other asymmetric means to challenge the United States. Iran's efforts include the acquisition and development of NBC weapons and missiles and use of terrorism, which it views as a means to offset its own vulnerabilities and weaknesses. With help from Russia and North Korea, it has put particular emphasis in recent years on developing medium-range missiles.

Iran is one of the countries most active in seeking to acquire NBC- and missile-related technologies. Iran's NBC and missile programs continued in the last several years notwithstanding President Khatemi's moderation of the regime's anti-Western rhetoric. To support their development, Iran has focused its acquisition efforts mainly on Russia, China, and North Korea, and these countries remain instrumental to Iran's efforts. Iran remains intent on attaining an independent production capability for all its weapons programs and has continued to make substantial progress in that regard with its chemical, biological, and ballistic missile efforts. Iran's public display of these missiles and its July and September 2000 flight tests of the Shahab-3 reflect Tehran's intent to demonstrate its ability to project military influence throughout the region.

DoD believes spending on NBC weapons and missiles has continued to receive a high priority within Iran's defense budget during the last several years. As Iran's economy is oil-based, the price of oil will influence the extent of Iran's defense spending and consequently the amount the government can spend on military programs and related NBC and missile efforts. The defense budget is believed to be almost $6 billion for the fiscal year ending 20 March 2001. It is expected to remain at about the same level for the next several years, or about 3 percent of Iran's GDP. Demographic, social, and political factors also affect the relative priority Iran puts on its national security spending.

Nuclear Program

Although a signatory to NPT and the CTBT, Iran also is seeking fissile material and technology for weapons development through an elaborate system of military

and civilian organizations. We believe Iran also has an organized structure dedicated to developing nuclear weapons by trying to establish the capability to produce both plutonium and highly enriched uranium. Iran claims to desire the establishment of a complete nuclear fuel cycle for its civilian energy program. In that guise, it seeks to obtain whole facilities that could be used in numerous ways in support of efforts to produce fissile material for a nuclear weapon. The potential availability of black market fissile material also might provide Iran a way to acquire the fissile material necessary for a nuclear weapon.

Iran's success in achieving a nuclear capability will depend, to a large degree, on the supply policies of Russia and China or on Iran's successful illicit acquisition of adequate quantities of weapons-usable fissile material. Russia is continuing work on a 1,000-megawatt power reactor at Bushehr. Although Russian officials have provided assurances that Russian cooperation with Iran will be limited to the Bushehr reactor project during the period of its construction, the United States Government is aware that a number of Russian entities are engaged in cooperation with Iran that goes beyond this project. One of Iran's primary goals is the acquisition of a heavy water-moderated, natural uranium-fueled nuclear reactor and associated facilities suitable for the production of weapons-grade plutonium. Although Bushehr will fall under IAEA safeguards, Iran is using this project to

Iran: NBC Weapons and Missile Programs

Nuclear	Seeking fissile material and related nuclear technology for weapons development, especially from sources in Russia. Russia is completing construction of power reactor at Bushehr and recently agreed to additional nuclear cooperation; China has pledged not to sell a key facility and other nuclear technologies. Acceded to the NPT and signed the CTBT.
Biological	Possesses overall infrastructure and expertise to support biological warfare program. Pursues contacts with Russian entities and other sources to acquire dual-use equipment and technology. Believed to be actively pursuing offensive biological warfare capabilities; may have small quantities of usable agent now. Ratified the BWC.
Chemical	Began chemical warfare program during Iran-Iraq war; employed limited amounts of agent against Iraqi troops. Possesses weaponized stockpile of agents; capable of agent delivery; trains military forces to operate in contaminated environment. Seeking to improve chemical precursor production capability. Ratified the CWC and made declarations.
Ballistic Missiles	Has force of SCUD B, SCUD C and Chinese-made CSS-8 SRBMs; producing SCUDs. Main effort is to produce Shahab-3 MRBM, based on North Korean No Dong; effort involves considerable Russian and Chinese assistance. Flight tested Shahab-3 in July 1998, and in July and September 2000 Seeking to develop additional longer-range missiles, such MRBMs, IRBMs and possibly an ICBM. Not a member of the MTCR.
Other Means of Delivery Available	Land-, sea-, and air-launched anti-ship cruise missiles; air-launched tactical missiles; none have NBC warheads. Aircraft: fighters. Ground systems: artillery, rocket launchers.

seek access to more sensitive nuclear technologies from Russia and to develop expertise in related nuclear technologies. Any such projects will help Iran augment its nuclear technology infrastructure, which in turn would be useful in supporting nuclear weapons research and development.

In the past, Chinese companies have been major suppliers of nuclear-related facilities and technology albeit under IAEA safeguards. China pledged in 1997 that it would not undertake any new nuclear cooperation with Iran and that it would close out its two existing projects — a small research reactor and a zirconium production facility, which will produce cladding for nuclear fuel — as soon as possible. (Neither of these two projects poses a significant proliferation concern.) China also agreed to terminate cooperation on a uranium conversion project. This project would have allowed Iran to produce uranium hexafluoride or uranium dioxide, which are the feedstock materials for the manufacture of weapons grade plutonium. In addition, China announced new export controls in June 1998 that cover the sale of dual-use nuclear equipment. China appears to be living up to its 1997 commitments.

Biological Program

Iran has a growing biotechnology industry, significant pharmaceutical experience and the overall infrastructure to support its biological warfare program. Tehran has expanded its efforts to seek considerable dual-use biotechnical materials and expertise from entities in Russia and elsewhere, ostensibly for civilian reasons. Outside assistance is important for Iran, and it is also difficult to prevent because of the dual-use nature of the materials and equipment being sought by Iran and the many legitimate end uses for these items.

Iran's biological warfare program began during the Iran-Iraq war. Iran is believed to be pursuing offensive biological warfare capabilities and its effort may have evolved beyond agent research and development to the capability to produce small quantities of agent. Iran has ratified the BWC.

Chemical Program

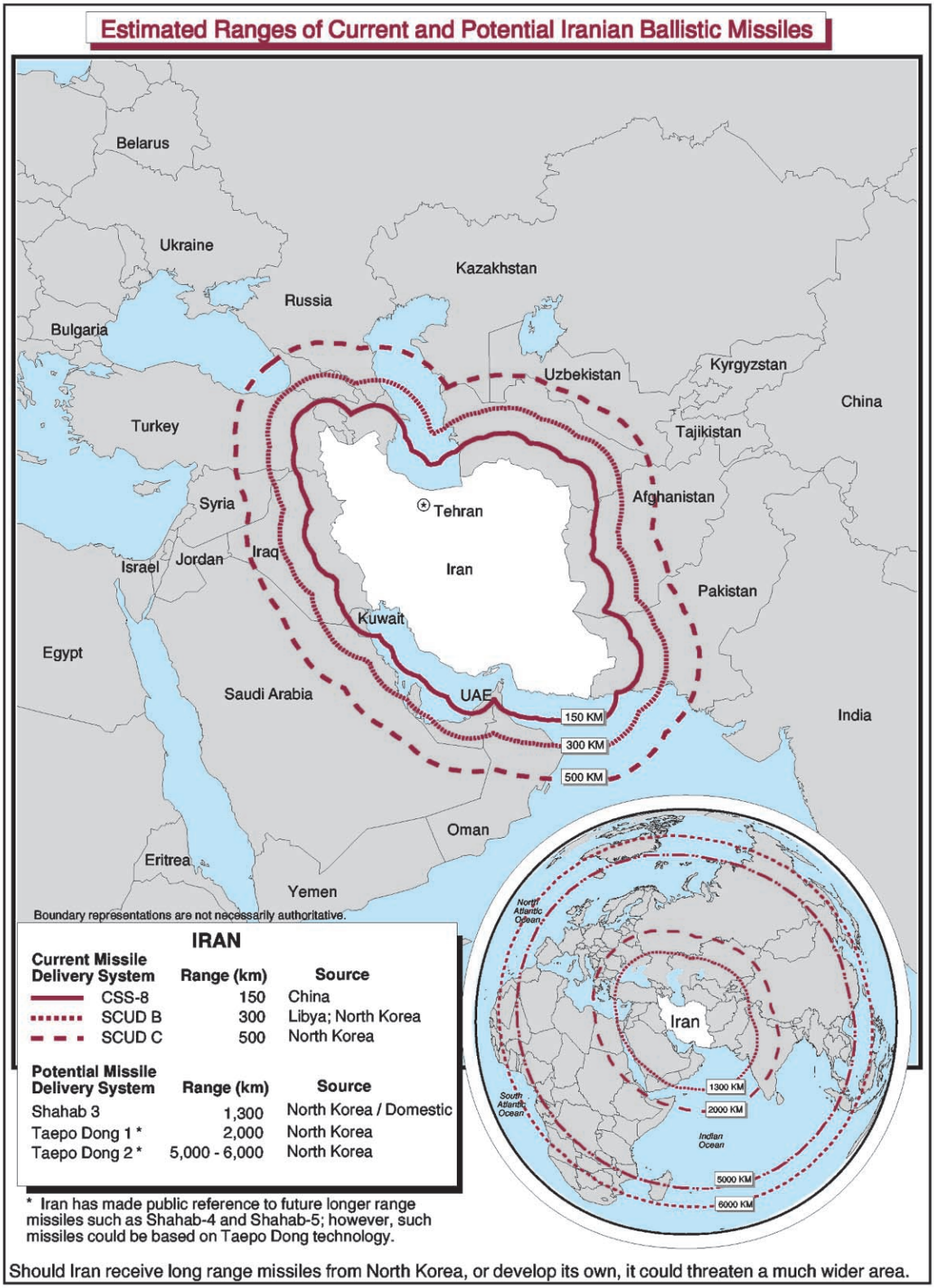
Iran has acceded to the Chemical Weapons Convention (CWC) and in a May 1998 session of the CWC Conference of the States Parties, Tehran, for the first time, acknowledged the existence of a past chemical weapons program. Iran admitted developing a chemical warfare program during the latter stages of the Iran-Iraq war as a "deterrent" against Iraq's use of chemical agents against Iran. Moreover, Tehran claimed that after the 1988 cease-fire, it "terminated" its program. However, Iran has yet to acknowledge that it, too, used chemical weapons during the Iran-Iraq War.

Nevertheless, Iran has continued its efforts to seek production technology, expertise and precursor chemicals from entities in Russia and China that could be used to create a more advanced and self-sufficient chemical warfare infrastructure. As Iran's program moves closer to self-sufficiency, the potential will increase for Iran to export dual-use chemicals and related equipment and technologies to other countries of proliferation concern.

In the past, Tehran has manufactured and stockpiled blister, blood and choking chemical agents, and weaponized some of these agents into artillery shells, mortars, rockets, and aerial bombs. It also is believed to be conducting research on nerve agents. Iran could employ these agents during a future conflict in the region. Lastly, Iran's training, especially for its naval and ground forces, indicates that it is planning to operate in a contaminated environment.

Ballistic Missiles

Iran has increased emphasis on its ballistic missile program. Currently, Iran has several hundred SCUD Bs and SCUD Cs and Chinese-made CSS-8 SRBMs. It is now producing SCUD missiles, having received production assistance from North Korea. In recent years, Russian and Chinese entities have continued to supply a wide variety of missile-related goods, technology, and expertise to Iran. Iran is striving to indigenously produce ballistic missiles and become a supplier state. Iran's recent efforts have been on the development of the 1,300-kilometer range Shahab-3


Estimated Ranges of Current and Potential Iranian Ballistic Missiles
Belarus
Ukraine
Kazakhstan
Russia
Bulgaria
Uzbekistan
Kyrgyzstan
China
Turkey
Tajikistan
Afghanistan
Syria
Tehran
Iraq
Israel
Jordan
Iran
Pakistan
Kuwait
Egypt
Saudi Arabia
UAE
India
150 KM
300 KM
500 KM
Oman
Eritrea
Yemen
Boundary representations are not necessarily authoritative.
IRAN
Current Missile Delivery System
Range (km)
Source
CSS-8 150 China
SCUD B 300 Libya; North Korea
SCUD C 500 North Korea
Potential Missile Delivery System
Range (km)
Source
Shahab 3 1,300 North Korea / Domestic
Taepo Dong 1 * 2,000 North Korea
Taepo Dong 2 * 5,000 - 6,000 North Korea
* Iran has made public reference to future longer range missiles such as Shahab-4 and Shahab-5; however, such missiles could be based on Taepo Dong technology.
North Atlantic Ocean
Iran
South Atlantic Ocean
Indian Ocean
1300 KM
2000 KM
5000 KM
6000 KM
Should Iran receive long range missiles from North Korea, or develop its own, it could threaten a much wider area.

missile, which is based on the North Korean No Dong. Iran flight-tested the Shahab-3 in July 1998 and July and September 2000. At this time, Iran likely has the capability to deploy limited numbers of Shahab-3.

Iran has built and publicly displayed prototypes of this MRBM and may have achieved an emergency operational capability for it. That is, it could deploy a limited number of the missiles in an operational mode during a perceived crisis. In fact, in July 2000, just prior to the missile's second flight test, the commander of Iran's Revolutionary Guards Corps stated that Iran had formed Shahab-3 units and built launching pads for the missiles (Janes Defense Weekly). While this may overstate Iran's current capabilities, it clearly demonstrates Iran's intent.

In addition, Iran's Defense Minister publicly acknowledged the development of the Shahab-4, originally calling it a more capable ballistic missile than the Shahab-3, but later categorizing it as solely a space launch vehicle with no military applications. Iran's Defense Minister also has publicly mentioned plans for a "Shahab-5," which may be an IRBM or a space launch vehicle. Such statements, made against the backdrop of sustained cooperation with Russian, North Korean, and Chinese entities, suggest that Tehran may intend to develop and deploy a longer-range ballistic missile capability. In addition, Iran will likely continue to seek longer-range missiles and may have ICBM ambitions. It could test a space launch vehicle, which would have ICBM applications, within the next 15 years. However, if Iran purchased an ICBM from North Korea or elsewhere, further development might not be necessary.

Cruise Missiles and Other Means of Delivery

Iran has purchased land-, sea-, and air-launched short-range cruise missiles from China; it also has a variety of foreign-made air-launched short-range tactical missiles, which are potential means of delivery for NBC weapons. Many of these systems are deployed as anti-ship weapons in or near the Persian Gulf. In the future, Iran likely will continue to focus on its anti-ship missile capabilities and may try to develop its own missiles using technology it already has as a basis for such development efforts. In addition, Tehran also could try to purchase land attack cruise missiles to complement its ballistic missile force. However, the pace of any of these efforts will be determined by Iran's economic situation. Iran also has a variety of fighter aircraft, artillery, and rockets available as potential means of delivery for NBC weapons.

Potential as a Supplier

Iran has put emphasis on becoming independent in the indigenous production of various military hardware, including NBC weapons and missiles. As Iran has made progress in the last few years, particularly in the areas of chemical warfare and ballistic missiles, the potential has increased for it to export some of these weapons, related technology, or expertise to other countries of proliferation concern, such as Libya or Syria.

IRAQ

Objectives, Strategies, and Resources

Iraq believes NBC weapons and ballistic missiles are necessary if it is to reach its goal of being the dominant power in the region. Since the end of the Gulf War, Baghdad steadfastly resisted the terms of the cease-fire agreement, which required it to cooperate with the United Nations Special Commission (UNSCOM) and the IAEA in identifying and eliminating Iraq's NBC and theater ballistic missile capabilities. Iraq's policy of deception and denial sparked numerous confrontations with UNSCOM and the IAEA over the years and culminated with the allied bombing of Iraq under Operation Desert Fox in December 1998.

Since late 1998, Baghdad has refused to allow UN inspectors into Iraq as required by UN Security Council Resolutions (UNSCRs) 687, 707, 715 and 1284. (UNSCR 1284, adopted in December 1999, established a follow-on regime to UNSCOM called the United Nations Monitoring, Verification and Inspection Commission [UNMOVIC]). As a result, there have been no UN inspections for over two years, and the automated monitoring systems installed by the UN at known and suspected Iraqi NBC and missile facilities are no longer operational. This abeyance of on-site inspections and our previous judgments about Iraqi

intentions raise concerns that Iraq may have begun such reconstitution efforts and that it will again be able to threaten its neighbors. In support of these rebuilding efforts, Iraq is known to have attempted to purchase numerous dual-use items under the guise of legitimate civil use since the end of the Gulf War.

Iraq remains largely a petroleum-based economy. Prior to the 1990 Iraqi invasion of Kuwait, Iraq's petroleum sector accounted for 61 percent of its GDP and about $14.5 billion in exports; per capita GDP was $2,270. UN sanctions subsequently were imposed on Iraq, and since then there has been a significant decline in Iraqi economic output. Increased illegal petroleum product exports since 1996 and crude oil exports allowed by the UN since 1997 have led to significant growth in the industrial and petroleum sectors since 1996. However, under UNSCR 1284, Iraq can export any volume of petroleum for humanitarian needs. Nonetheless, inflation fluctuates wildly depending on supply and demand, the political situation, and regime market manipulation; inflation estimates range from 90 to almost 300 percent. While oil exports are still a dominant economic force in Iraq, Iraqi per capita GDP was reported to have dropped to $587 by 1999. Despite these severe pressures on its economy, Saddam Hussein's government continues to devote Iraqi resources to rebuilding certain portions of its NBC weapons and missile infrastructure.

Nuclear Program

Iraq has ratified the NPT. Nevertheless, before the Gulf War, Iraq had a comprehensive nuclear weapons

Iraq: NBC and Missile Programs

Nuclear	Had comprehensive nuclear weapons development program prior to Operation Desert Storm. Infrastructure suffered considerable damage from Coalition bombing and IAEA dismantlement. Retains scientists, engineers, and nuclear weapons design information; without fissile material, would need five or more years and significant foreign assistance to rebuild program and produce nuclear devices; less time would be needed if sufficient fissile material were acquired illicitly. Ratified the NPT; has not signed the CTBT.
Biological	Produced and weaponized significant quantities of biological warfare agents prior to Desert Storm. Admitted biological warfare effort in 1995, after four years of denial; claimed to have destroyed all agents, but offered no credible proof. May have begun program reconstitution in absence of UN inspections and monitoring. Acceded to the BWC.
Chemical	Rebuilt some of its chemical production infrastructure allegedly for commercial use. UNSCOM discovered evidence of VX persistent nerve agent in missile warheads in 1998, despite Iraqi denials for seven years that it had not weaponized VX. May have begun program reconstitution in absence of UN inspections and monitoring. Has not signed the CWC.
Ballistic Missiles	Probably retains limited number of SCUD-variant missiles, launchers, and warheads capable of delivering biological and chemical agents. Retains significant missile production capability. Continues work on liquid- and solid-propellant SRBMs (150 kilometers) allowed by UNSCR 687; likely will use technical experience gained for future longer range missile development effort. Not a member of the MTCR.
Other Means of Delivery Available	Land-launched anti-ship cruise missiles; air-launched tactical missiles; none have NBC warheads; stockpile likely is very limited. Air systems: fighters, helicopters, UAVs. Ground systems: artillery, rockets.

development program that was focused on building an implosion-type device. The program was linked to a ballistic missile project that was the intended delivery system. From April 1991 to December 1998, Iraqi nuclear aspirations were held in check by IAEA/UNSCOM inspections and monitoring. All known weapons-grade fissile material was removed from the country. Although Iraq claims that it destroyed all of the specific equipment and facilities useful for developing nuclear weapons, it still retains sufficient skilled and experienced scientists and engineers as well as weapons design information that could allow it to restart a weapons program.

Iraq would need five or more years and key foreign assistance to rebuild the infrastructure to enrich enough material for a nuclear weapon. This period would be substantially shortened should Baghdad successfully acquire fissile material from a foreign source.

Biological Program

Iraq's continued refusal to disclose fully the extent of its biological program suggests that Baghdad retains a biological warfare capability, despite its membership in the BWC. After four and one-half years of claiming that it had conducted only "defensive research" on biological weapons Iraq declared reluctantly, in 1995, that it had produced approximately 30,000 liters of bulk biological agents and/or filled munitions. Iraq admitted that it produced anthrax, botulinum toxins and aflatoxins and that it prepared biological agent-filled munitions, including missile warheads and aerial bombs. However, UNSCOM believed that Iraq had produced substantially greater amounts than it has admitted — three to four times greater.

Iraq also admitted that, during the Persian Gulf War, it had deployed biological agent-filled munitions to airfields and that these weapons were intended for use against Israel and coalition forces in Saudi Arabia. Iraq stated that it destroyed all of these agents and munitions in 1991, but it has provided insufficient credible evidence to support this claim.

The UN believes that Baghdad has the ability to reconstitute its biological warfare capabilities within a few weeks or months, and, in the absence of UNSCOM inspections and monitoring during 1999 and 2000, we are concerned that Baghdad again may have produced some biological warfare agents.

Chemical Program

Since the Gulf War, Baghdad has rebuilt key portions of its industrial and chemical production infrastructure; it has not become a state party to the CWC. Some of Iraq's facilities could be converted fairly quickly to production of chemical warfare agents. Following Operation Desert Fox, Baghdad again instituted a rapid reconstruction effort on those facilities to include former dual-use chemical warfare-associated production facilities, destroyed by U.S. bombing. In 1999, Iraq may have begun installing or repairing dual-use equipment at these and other chemical warfare-related facilities. Previously, Iraq was known to have produced and stockpiled mustard, tabun, sarin, and VX, some of which likely remain hidden. It is likely that an additional quantity of various precursor chemicals also remains hidden.

In late 1998, UNSCOM reported to the UN Security Council that Iraq continued to withhold information related to its chemical program. UNSCOM cited an example where Baghdad seized from inspectors a document discovered by UNSCOM inspectors, which indicated that Iraq had not consumed as many chemical munitions during the Iran-Iraq War as had been declared previously by Baghdad. This document suggests that Iraq may have an additional 6,000 chemical munitions hidden. Similarly, UNSCOM discovery in 1998 of evidence of VX in Iraqi missile warheads showed that Iraq had lied to the international community for seven years when it repeatedly said that it had never weaponized VX.

Iraq retains the expertise, once a decision is made, to resume chemical agent production within a few weeks or months, depending on the type of agent. However, foreign assistance, whether commercial procurement of dual-use technology, key infrastructure, or other aid, will be necessary to completely restore Iraq's

Estimated Ranges of Current and Potential Iraqi Ballistic Missiles

IRAQ

Current Missile Delivery System	Range (km)	Source
Al Hussein	650	Domestic Production

Potential Missile Delivery System	Range (km)	Source
Ababil / Al Samoud	100 - 150	Domestic Production
Al Abbas	950	Domestic Production

Iraq fired nearly 90 Al Hussein missiles at Israel and the Arabian Peninsula during DESERT STORM. Its current work on the Ababil / Al Samoud SRBMs allows Iraq to maintain proficiency for future longer-range missiles, which could again threaten Israel and large areas of the Arabian Peninsula.

chemical agent production capabilities to pre-Desert Storm levels. Iraqi doctrine for the use of chemical weapons evolved during the Iran-Iraq War, and was fully incorporated into Iraqi offensive operations by the end of the war in 1988. During different stages of that war, Iraq used aerial bombs, artillery, rocket launchers, tactical rockets, and sprayers mounted in helicopters to deliver agents against Iranian forces. It also used chemical agents against Kurdish elements of its own civilian population in 1988.

Ballistic Missiles

Iraq likely retains a limited number of launchers and SCUD-variant SRBMs capable of striking its neighbors, as well as the components and manufacturing means to assemble and produce others, anticipating the reestablishment of a long-range ballistic missile force sometime in the future. Baghdad likely also has warheads capable of delivering chemical or biological agents. While Iraq's missile production infrastructure was damaged during the December 1998 strikes, Iraq retains domestic expertise and sufficient infrastructure to support most missile component production, with the exception of a few critical subelements.

During 1999, Iraq continued to work on the two short-range ballistic missile systems that fall within the 150-kilometer range restriction imposed by the UN: the liquid-propellant Al Samoud and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down SCUD, and work on it allows Baghdad to develop technological capabilities that could be applied to a longer-range missile program. We believe that the Al Samoud missile, as designed by the Iraqis, has an inherent potential to exceed the 150-kilometers range restriction imposed under UNSCR 687. Iraqi personnel involved with pre-Desert Storm ballistic missile efforts are working on the Ababil-100 SRBM program. Once economic sanctions against Iraq are lifted, unless restricted by future UN monitoring, Baghdad probably will begin converting these efforts into longer-range missile systems. Despite the damage done to Iraq's missile infrastructure during the Gulf War, Desert Fox, and subsequent UNSCOM activities, Iraq may have ambitions for longer-range missiles, including an ICBM. Depending on the success of acquisition efforts and degree of foreign support, it is possible that Iraq could develop and test an ICBM capable of reaching the United States by 2015.

Cruise Missiles and Other Means of Delivery

Iraq may have a very limited stockpile of land-launched short-range anti-ship cruise missiles and air-launched short-range tactical missiles that it purchased from China and France prior to the Gulf War. These are potential means of delivery for NBC weapons. Iraq also has a variety of fighter aircraft, helicopters, artillery, and rockets available as potential means of delivery for NBC weapons, although their operational status is questionable due to the cumulative effects of the UN arms embargo. However, Iraq has continued to work on its UAV program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. These modified and refurbished L-29s may be intended for the delivery of chemical or biological agents. In the future, Iraq may try to use its research and development infrastructure to produce its own UAVs and cruise missiles or, should the UN arms embargo be lifted, it could try to purchase cruise missiles.

SYRIA

Objectives, Strategies, and Resources

Syria's national security objectives will not likely change following the death of Hafez al Asad. These objectives include preserving the new regime of Asad's son, Bashir al Asad, regaining the entire Golan Heights, protecting Syrian territory, maintaining internal stability, and protecting Syrian interests in Lebanon. Damascus also seeks to avoid regional isolation and play a leading role in the Arab world. It has long perceived itself to be surrounded by hostile neighbors, and most of Syria's armed forces are arrayed against Israel, which it perceives to be its primary external threat. Syria has sought to avoid regional isolation by maintaining strong ties with Iran and, more recently, warming relations with Iraq.

Since the loss of its Soviet sponsor a decade ago and its inability to achieve conventional parity with Israel, Syria has increasingly relied on a strategic deterrent,

based on ballistic missiles and chemical warfare capabilities, as the ultimate guarantor of regime survival against potential regional adversaries. Syria also likely sees the development of these weapons as a cheaper alternative than trying to achieve conventional parity with Israel. As a result, Damascus has continued to develop and expand its ballistic missile and chemical weapons capabilities, and, to lesser extent, biological weapons capabilities. Syria is likely to maintain and improve these capabilities over the long term.

Syria's total defense spending has remained relatively stable at $1 billion in constant 1997 prices since the early 1990s. This spending represents nearly 6 percent of Syria's GDP. While Syria has spent a small percentage on the acquisition of conventional hardware, it appears to have shifted emphasis to chemical, biological, and missile programs, which offer a more affordable alternative and receive a high budget priority.

In the past, Damascus has shown itself to be a pragmatic actor and to calculate carefully the results of its actions; this is likely to continue under the regime of Bashir al Asad. As a result, Syria would likely refrain from using chemical or biological weapons against Israel — especially given its fear of an Israeli response with NBC weapons — unless the regime's survival is at stake. The new regime of Bashir al Asad likely will maintain and improve Syrian missile and chemical and biological warfare capabilities.

Nuclear Program

Syria is not pursuing the development of nuclear weapons. However, it retains an interest in nuclear technology and has a small Chinese-supplied research reactor, which is under IAEA safeguards. In addition, in May 1999, Syria signed a broad nuclear cooperation agreement with Russia, which includes the construction of a small light-water research reactor, which will be subject to IAEA safeguards. Syria currently lacks the infrastructure and trained personnel to establish a nuclear weapons program. Syria has ratified the NPT, but has not signed the CTBT.

Syria: NBC Weapons and Missile Programs

Nuclear	Is not pursuing the development of nuclear weapons. Ratified the NPT; has not signed the CT&T.
Biological	Possesses adequate biotechnical infrastructure to support limited biological warfare program. Believed to be pursuing biological agent development, but no major agent production effort likely is underway. Signed but not ratified the BWC.
Chemical	Possesses and is capable of delivering nerve agents; may be developing more advanced VX nerve agent. Making improvements to chemical infrastructure. Has not signed the CWC.
Ballistic Missiles	Maintains and is capable of using force of SCUD B, SCUD C, and SS-21 missiles. Producing SCUD Cs with North Korean assistance. Making improvements to missile production infrastructure. Not a member of the MTCR.
Other Means of Delivery Available	Land- and sea-launched anti-ship cruise missiles; none have NBC warheads. Aircraft: fighters, helicopters. Ground systems: artillery, rockets.


Estimated Ranges of Current Syrian Ballistic Missiles
Ukraine
Romania
Russia
Black Sea
Bulgaria
Georgia
500 KM
Azerbaijan
Armenia
Turkey
300 KM
Caspian Sea
75 KM
Syria
Iran
Mediterranean Sea
Cyprus
Lebanon
Damascus
Iraq
Israel
Jordan
Egypt
Kuwait
Persian Gulf
Saudi Arabia
Boundary representations are not necessarily authoritative.
SYRIA
Current Missile Delivery System
Range (km)
Source
SS-21
75
Former Soviet Union
SCUD B
300
Former Soviet Union / Domestic Production
SCUD C
500
North Korea / Domestic Production
Syria's SCUD missiles allow it to threaten all of Israel and major portions of Turkey.

Biological Program

Syria has signed but not ratified the BWC but nonetheless is pursuing the development of biological weapons. Syria's biotechnical infrastructure is capable of supporting limited agent development. However, the Syrians are not believed to have begun any major effort to put biological agents into weapons. Without significant foreign assistance, it is unlikely that Syria could manufacture significant amounts of biological weapons for several years.

Chemical Program

Syria is not a state party to the CWC and has had a chemical warfare program for many years, although it has never used chemical agents in a conflict. Damascus already has a stockpile of the nerve agent sarin that can be delivered by aircraft or ballistic missiles. Additionally, Syria is trying to develop the more toxic and persistent nerve agent VX. In the future, Syria can be expected to continue to improve its chemical agent production and storage infrastructure. Damascus remains dependent on foreign sources for key elements of its chemical warfare program, including precursor chemicals and key production equipment. For example, during 1999, Syria sought chemical warfare-related precursors and expertise from foreign sources.

Ballistic Missiles

Syria has a combined total of several hundred SCUD B, SCUD C and SS-21 SRBMs. Syria is believed to have chemical warheads available for a portion of its SCUD missile force. Damascus continues to acquire SCUD-related equipment and materials from Iran and North Korea, including considerable North Korean help producing SCUD Cs.

During 1999, Damascus continued to work on establishing a solid-propellant rocket motor development and production capability with help from outside sources such as Iran. In addition, foreign equipment and assistance for its liquid propellant missile program, primarily from North Korean entities but also from firms in China and Russia, have been and will continue to be essential for Syria's effort. The Syrians are laying the groundwork for a future option to develop a modern, solid-propellant SRBM. All of Syria's missiles are mobile and can reach much of Israel and large portions of Iraq, Jordan, and Turkey from launch sites well within the country.

Cruise Missiles and Other Means of Delivery

Syria has a variety of Soviet-made land- and sea-launched short-range anti-ship cruise missiles and air-launched short-range tactical missiles, which are potential means of delivery for NBC weapons. Because of higher defense priorities, Syria probably will not try to purchase additional cruise missiles for several years. Syria also has numerous fighter aircraft, helicopters, artillery, and rockets available.

LIBYA

Objectives, Strategies, and Resources

The primary objectives of Libyan leader Qadhafi have been to promote Libya as a defender of Islamic ideals against Western imperialism and to promote Pan-Arabism, and more recently, Pan-Africanism. Over the years, these goals have translated into a long history of promoting regional destabilization and terrorism. In 1992, in response to suspected Libyan involvement in the bombing of Pan American flight 103, the UN imposed sanctions on Libya. (The sanctions included an arms embargo, a ban on flights to and from Libya, a one-time freeze on Libyan government financial assets abroad, and a ban on Libyan exports of nonagricultural and nonpetroleum exports.) However, in April 1999, in response to the Libyan extradition of the two suspects to The Hague for trial, the UN suspended its sanctions. Shortly thereafter, the European Union reestablished economic relationships with Libya, and, in July 1999, Britain reestablished diplomatic relations with Libya.

Nevertheless, we believe that Qadhafi remains committed to developing or acquiring NBC weapons and improved ballistic missile capabilities. With the suspension of UN sanctions, Libya likely has increased its procurement efforts in support of its NBC weapons and missile programs. For example, in January 2000, British authorities at Gatwick Airport seized missile components from a Taiwan company that were destined for Libya; the components were labeled as auto parts. Qadhafi likely believes that these weapons will advance

his regime's international image and serve as deterrents against the West's more sophisticated weapons.

Libya's programs have made little progress in the last several years, due to a weak economy and an insufficient technological infrastructure. However, even though the programs have resulted only in limited capabilities, their use cannot be discounted because of Qadhafi's history of unpredictability. On the other hand, during 1999, Qadhafi has taken a more moderate international stance and acted as host for the Organization of African Unity (OAU) conference in September 1999. He may be hoping that his actions will result in the permanent lifting of sanctions and an overall thaw in Libya's relations with the West.

Libya's economy has suffered from the cumulative effects of years of socialist-oriented policies that allocate substantial resources to grandiose industrial schemes, low worker productivity, and a weak nonpetroleum industrial base. Libya does not publicly disclose its annual defense budget. Subsequent to the April 1999 suspension of UN sanctions, international petroleum prices rebounded, resulting in several billion dollars more in annual export earnings for Libya. Such factors could permit Libya to increase military spending, with a potential increased emphasis on NBC weapons and the missile program.

Nuclear Program

Libya has ratified the NPT, but has not signed the CTBT and has long intended to develop or acquire nuclear weapons. Libya has made little progress, however, as its nuclear program lacks well-developed plans, expertise, consistent financial support, and adequate foreign suppliers. In the face of these difficulties, nonetheless, Libya likely will continue to try to develop a supporting infrastructure. Libya has a Soviet-supplied research reactor at Tajura that is under IAEA safeguards. The Russians may become actively involved in the modernization of the Tajura nuclear research center and, in 1999, Tripoli and Moscow resumed discussions on cooperation involving the Tajura reactor as well as a potential power reactor deal. Should this civil sector work come to fruition, Libya could gain opportunities to conduct nuclear weapons-related research and development. Libya reportedly also is trying to recruit foreign scientists and technicians to aid its program.

Libya: NBC Weapons And Missile Programs

Nuclear	Has made little progress with long-standing goal of acquiring or developing a nuclear weapon; may be trying to recruit foreign experts to assist with effort. Ratified the NPT; has not signed the CTBT. Signed the African Nuclear Weapon Free Zone Treaty.
Biological	Remains in research and development stage, but may be capable of producing small quantities of agent. Ratified the BWC.
Chemical	Produced blister and nerve agents in 1980s at Rabta; employed chemical agents against Chadian troops in 1987; attempted to construct underground chemical agent production facility at Tarhunah. Rabta and Tarhunah believed to be inactive, although chemical program not completely abandoned. Has not signed the CWC.
Ballistic Missiles	Maintains aging SCUD missile force of limited operational utility. Has made only limited success with over 20-year indigenous missile production effort; may renew focus on purchasing complete ballistic missile. Not a member of the MTCR.
Other Means of Delivery Available	Land- and sea-launched anti-ship cruise missiles; none have NBC warheads. Aircraft: fighters, bombers, helicopters, transport planes. Ground systems: artillery, rocket launcher.

Biological Program

Libya has ratified the BWC, but has continued a biological warfare program. This program has not advanced beyond the research and development stage, although it may be capable of producing small quantities of biological agent. Libya's program has been hindered by the country's poor scientific and technological base, equipment shortages, and a lack of skilled personnel, as well as by UN sanctions in place from 1992 to 1999. Without foreign assistance and technical expertise to help Libya use available dual-use materials, the Libyan biological warfare program is not likely to make significant progress beyond its current stage. On the other hand, with the suspension of UN sanctions, Libya's ability to acquire biological-related equipment and expertise will increase.

Chemical Program

Among any of its NBC programs, Libya has made the most progress with its chemical warfare effort. However, it remains heavily dependent on foreign suppliers for precursor chemicals, mechanical and technical expertise, and chemical warfare-related equipment. From 1992 to 1999, UN sanctions continued to limit the type and amount of support Tripoli receives from abroad. However, following the suspension of UN sanctions in April 1999, Libya wasted no time in reestablishing contacts with foreign sources of expertise, parts, and precursor chemicals for its program. Clearly, Tripoli has not given up its goal of reestablishing its offensive chemical warfare ability and continues to pursue an indigenous chemical warfare production capability.

Prior to 1990, Libya produced about 100 tons of chemical agents — mustard and some nerve agent — at a chemical facility at Rabta. However, it ceased production there in 1990 due to intense international media attention and the possibility of military intervention, and fabricated a fire to make the Rabta facility appear to have been seriously damaged. Libya maintains that the facility is a pharmaceutical production plant and announced in September 1995 that it was reopening the Rabta pharmaceutical facility. Although production of chemical agents has been halted, the Rabta facility remains part of the Libyan chemical weapons program, and future agent production cannot be ruled out.

After 1990, the Libyans shifted their efforts to trying to build a large underground chemical production facility at Tarhunah. However, the pace of activity there has slowed, probably due to increased international attention. The Libyans claim that the Tarhunah tunnel site is a part of the Great Man-made River Project, a nationwide irrigation effort. Libya has not become a state party to the CWC.

Ballistic Missiles

Despite the presence of UN sanctions from 1992 to 1999, Libya continued to seek ballistic missile-related equipment, materials, technology, and expertise. However, the sanctions restricted the flow of ballistic missile goods and technology ultimately reaching Tripoli, although Libya has successfully obtained them, most notably from Serbia and from Indian companies. Such foreign assistance is critical to maintaining Libya's missile development program and, with the 1999 suspension of UN sanctions, Libya may have greater latitude to seek foreign assistance. Libya continues to maintain an aging SCUD missile force, although the missiles likely suffer from poor maintenance and their operational status is questionable.

Libya has tried, with limited success, to develop its own indigenous missile, and to extend the range of its aging SCUD force for many years under the Al Fatah and other missile programs. These indigenous programs are heavily dependent on foreign support and remain in the testing phase. Similarly, Libya's SCUD modification efforts also have shown little progress despite some foreign assistance. Tripoli also is interested in a longer-range missile, such as the North Korean No Dong MRBM, or a similarly capable system, which it may pursue in light of the suspended UN sanctions. Should Libya succeed with its effort to purchase or perhaps develop such a missile, the missile could threaten Egypt, Israel, NATO countries in southern Europe and U.S. forces in the Mediterranean region.


Estimated Ranges of Current and Potential Libyan Ballistic Missiles
Germany
Poland
Ukraine
France
Russia
Romania
Black Sea
Serbia
Bulgaria
Italy
Spain
Portugal
Mediterranean Sea
Greece
Turkey
Tunisia
Cyprus
Syria
Iraq
Morocco
Tripoli
Israel
Jordan
Saudi Arabia
Algeria
Libya
Egypt
200 KM
300 KM
Mali
Niger
Eritrea
Burkina
Chad
Sudan
Togo
Nigeria
Ethiopia
1300 KM
Ghana
Boundary representations are not necessarily authoritative.
Gulf of Guinea
Cameroon
LIBYA
Current Missile Delivery System
Range (km)
Source
SCUD B
300
Former Soviet Union
Potential Missile Delivery System
Range (km)
Source
Al Fatah
200
Domestic Production
No Dong
1,300
North Korea
Since the suspension of UN sanctions in April 1999, Libya has expanded its missile technology procurement effort.

Cruise Missiles and Other Means of Delivery

Libya has land- and sea-launched short-range anti-ship cruise missiles that it purchased from Soviet and European sources, which are potential means of delivery for NBC weapons. Many of the systems are old and likely are suffering from maintenance problems. In the future, while Libya likely will continue to focus on its anti-ship missile capabilities, it may try to purchase land attack cruise missiles. Libya also has a variety of fighter aircraft, some bombers, helicopters, artillery, and rockets available. Libya used transport aircraft in its attempt to deliver chemical agents against Chadian troops in 1987.

SUDAN

Objectives, Strategies, and Resources

Sudan likely will remain beset with civil war, at least in the south, for the next year. Recent political and diplomatic actions in Khartoum indicate that the National Congress Party (NCP) is attempting to moderate and change its public image. Nonetheless, this has created no momentum towards peace. President Bashir had been locked in an internal struggle with former NCP ideologue Turabi, who is now the head of a second, competing political party. In December 1999, Bashir moved against Turabi, removing him as Secretary General of the NCP. Bashir is concentrating on consolidating power, while his supporters believe the course he is setting for Sudan — breaking out of regional and international isolation and undercutting the effectiveness of southern and northern armed opposition — most likely will enable the NCP to remain the dominate political force in the country.

Even with Sudan's new political direction and increasingly savvy dealings with the international community, it is unlikely that cosmetic reforms will bring an end to the country's southern rebellion. Sudan's internal conflict will continue to destabilize the region due to the resulting humanitarian crisis and to the varying degrees of support for the rebels provided by bordering states.

Chemical Program

Sudan has been interested in acquiring a chemical warfare capability since the 1980s and has sought assistance from a number of countries with chemical warfare programs. We believe that Iraq, in particular, has provided technical expertise to Khartoum. In addition, the finding of a known VX precursor chemical near a pharmaceutical facility in Khartoum suggests that Sudan may be pursuing a more advanced chemical warfare capability. Sudan acceded to the CWC in 1999, although allegations of Sudanese chemical warfare use against rebels in southern Sudan have persisted. These, and prior allegations of chemical warfare use, have not been confirmed. Further, Khartoum's desire to present a more moderate image and alleviate its international isolation will cause Sudan to proceed with its chemical warfare program with caution.

Conclusion

Several states in the Middle East and Africa remain committed to the development or acquisition of NBC weapons and missile delivery systems. During the last few years, some of these states have made significant progress towards an independent production capability. As these states achieve production self-sufficiency, they, in turn, may become suppliers of NBC weapons or missiles, or related technologies, decreasing opportunities for effective counter-proliferation and complicating arms control diplomacy. In the Middle East, while some tensions have been reduced by progress in the peace process, the region as a whole remains volatile with a long history of conflict. This volatility increases the chances that some of these dangerous weapons will be used should a new conflict occur in the region, threatening key U.S. interests and putting U.S. and allied military forces at risk. Many, but not all, states have ratified key arms control regimes and treaties, but adherence is questionable in some cases, and some countries have denial and deception programs to conceal their efforts.

In the Middle East, we believe that Iran's actions, within the last year or so, demonstrate that it remains intent on developing or acquiring NBC weapons and missiles as part of a strategy to increase its influence in

the region and beyond. These actions include substantial progress, especially in the areas of chemical warfare and ballistic missiles. Although Iraq remains under UN sanctions, there have been no UN inspections since 1999, and Iraq may have begun to reconstitute its NBC weapons and missiles programs, which again could become a threat to Iraq's neighbors in the region. Syria is improving its chemical warfare program and could deliver chemical agents with missiles.

In Africa, while Libya's progress had been slowed by UN sanctions in the past, now that these sanctions have been suspended, Libya may renew procurement activity to support its NBC weapons and missile programs. Further, as long as Qadhafi remains in power, we will be concerned about Libya's efforts. Lastly, Sudan's interest in chemical warfare, and Khartoum's links to Iraq and Usama Bin Laden, will remain a cause for concern.

TRANSNATIONAL THREATS

U.S. Goals and Interests

The number one U. S. goal in the never-ending struggle of combating terrorism is the protection of the American people and our facilities. We will accomplish this through deterrence and punishment. Whenever possible, we use law enforcement and diplomatic tools to wage the fight against terrorism, but there have been, and will be, times when those tools are not enough.

Usama Bin Laden

The United States takes terrorist organizations and threats very seriously. In 1998, acting on convincing information from a variety of reliable sources that the network of radical groups affiliated with Usama Bin Laden had planned, financed, and carried out the bombings of our embassies in Nairobi and Dar es Salaam and planned future attacks against Americans, the United States carried out strikes on one of the most active terrorist bases in the world. Located in Afghanistan, it contained key elements of the Bin Laden network's infrastructure and has served as a training camp for literally thousands of terrorists from around the globe. The U.S. military also struck a plant in Khartoum, Sudan, that was linked by intelligence information to chemical weapons and to the Bin Laden terror network. The strikes were deemed a necessary and proportionate response to the imminent threat of further terrorist attacks against U.S. personnel and facilities and demonstrated that the U.S. government will seek out terrorists around the world, no matter where they try to seek refuge.

The U.S. policy to counter international terrorists rests on the following principles:

- Make no concessions with terrorists and make no deals.
- Bring terrorists to justice for their crimes.
- Isolate and apply pressure on states that sponsor terrorism to force them to change their behavior.
- Bolster the counterterrorist capabilities of those countries that work with the U.S. and require assistance.

As in the attacks against Bin Laden's terrorist organization, we attempt to deter all foreign terrorists and their support networks from attacking U.S. territory and U.S. citizens.

Introduction

Transnational proliferation includes those NBC threats that cross national or regional boundaries or are not otherwise easily categorized. The possible acquisition or use of NBC materials by terrorists, inadequate security of NBC materials, and threats to agriculture and livestock are some of the issues that greatly concern the United States and its allies.

Terrorism

Many of the technologies associated with the development of NBC weapons, especially chemical and biological agents, have legitimate civil applications and are classified as dual-use. The increased availability of these technologies, coupled with the relative ease of producing some chemical or biological agents, has increased concern that use of chemical or biological weapons may become more attractive to terrorist groups intent on causing panic or inflicting large numbers of casualties. In addition, the proliferation of such weapons raises the possibility that some states or entities within these states could provide NBC weapons to terrorists or to state-sponsored operatives for use abroad.

The likelihood of a state sponsor providing such a weapon to a terrorist group is believed to be low. It is possible, however, that groups, especially extremist groups with no ties to a particular state, could acquire and attempt to use such weapons in the future. Some groups, especially those motivated by distorted religious and cultural ideologies, have demonstrated a willingness to inflict greater numbers of indiscriminate

casualties. Other less predictable but potentially dangerous groups have also emerged. Those groups may not adhere to traditional targeting constraints. For example, the Japanese Aum Shinrikyo group attacked the Tokyo subway with the chemical nerve agent sarin in 1995, although it had failed in several reported attempts to carry out biological attacks, probably because of difficulties in agent production and dissemination. In addition, the Usama Bin Laden network, which was responsible for the conventional weapons attack on U.S. embassies in Kenya and Tanzania in 1998, is known to be interested in NBC weapons; in fact, Usama Bin Laden has spoken publicly about acquiring such a capability and likened his pursuit of those weapons to a religious duty.

Aum Shinrikyo continued efforts to rebuild itself in 1999. The group's recruitment, training, fundraising — especially a computer business that generated more than $50 million — and property acquisition, however, provoked numerous police raids and an extensive public backlash that included protests and citizen-led efforts to monitor and barricade Aum facilities.

In an effort to alleviate public pressure and criticism, Aum leaders in late September announced the group would suspend its public activities for an indeterminate period beginning 1 October. The cult openly pledged to close its branch offices, discontinue public gatherings, cease distribution of propaganda, shut down most of its Internet web site, and halt property purchases beyond that required to provide adequate housing for existing members. The cult also said it would stop using the name "Aum Shinrikyo." On 1 December, Aum leaders admitted the cult conducted the sarin attack and other crimes — which they had denied previously — and apologized publicly for the acts. The cult made its first compensation payment to victims' families in late December 1999.

Japanese courts sentenced one Aum member to death and another to life in prison for the subway attack, while trials for other members involved in the attack remain ongoing. The prosecution of cult founder Shoko Asahara continued at a sluggish pace, and a verdict remained years away. Japanese authorities remained concerned over the release in late December 1999 of popular former cult spokesman Fumihiro Joyu, who served a three-and-a-half-year jail sentence for perjury and is expected to return to the cult as a senior leader. The Japanese parliament in December passed legislation strengthening government authority to crack down on groups resembling the Aum and allowing the government to confiscate funds from the group to compensate victims. The Public Security Investigation Agency stated that it would again seek to outlaw the Aum under the Anti-Subversive Activities Law.

The Usama Bin Laden network's reported interest in NBC materials is a key concern in terms of possible future threats to U.S. interests. The network's interest in NBC materials has been noted since the early 1990s and, in 1999, Usama Bin Laden made public statements defending the right of the Muslim community to pursue NBC capabilities.

The bombings of the U.S. Embassies in Nairobi, Kenya, and in Dar es Salaam, Tanzania, on 7 August 1998 underscored the global reach of Usama Bin Laden — a longtime sponsor and financier of extremist causes — and brought to full public awareness his transition from sponsor to terrorist. A series of public threats to drive the United States and its allies out of Muslim countries foreshadowed the attacks, including what was presented as a fatwa (Muslim legal opinion) published on 23 February 1998 by Bin Laden and allied groups under the name "World Islamic Front for Jihad Against the Jews and Crusaders." The statement asserted it was a religious duty for all Muslims to wage war on U.S. citizens, military and civilian, anywhere in the world.

The seventeenth son of Saudi construction magnate Muhammad Bin Laden, Usama joined the Afghan resistance almost immediately after the Soviet invasion in December 1979. He played a significant role in financing, recruiting, transporting, and training Arab nationals who volunteered to fight in Afghanistan. During the war, Bin Laden founded al-Qaida (the Base) to serve as an operational hub for like-minded extremists. The Saudi government revoked his citizenship in 1994, and his family officially disowned him. He moved to Sudan in 1991, but international pressure on Khartoum forced him to move to Afghanistan in 1996.

The Usama Bin Laden network's reported interest in NBC materials is a key concern in terms of possible future threats to U.S. interests. The network's interest in NBC materials has been noted since the early 1990s and, in 1999, Usama Bin Laden made public statements defending the right of the Muslim community to pursue NBC capabilities.

Bin Laden has stated publicly that terrorism is a tool to achieve the group's goal of bringing Islamic rule to Muslim lands and "cleanse" them of Western influence and corruption. To this end, Bin Laden in 1999 led a broad-based, versatile organization. Suspects named in the wake of the Embassy bombings — Egyptians, one Comoran, one Palestinian, one Saudi, and U.S. citizens — reflect the range of al-Qaida operatives. The diverse groups under his umbrella afford Bin Laden resources beyond those of the people directly loyal to him. With his own inherited wealth, business interests, contributions from sympathizers in various countries, and support from close allies like the Egyptian and South Asian groups that signed his fatwa, he funds, trains, and offers logistic help to extremists not directly affiliated with his organization. He seeks to aid those who support his primary goals — driving U.S. forces from the Arabian Peninsula, removing the Saudi ruling family from power, and "liberating Palestine" — or his secondary goals of removing Western military forces and overthrowing what he calls corrupt, Western-oriented governments in predominantly Muslim countries. His organization has sent trainers throughout Afghanistan as well as to Tajikistan, Bosnia, Chechnya, Somalia, Sudan, and Yemen and has trained fighters from numerous other countries, including the Philippines, Egypt, Libya, Pakistan, and Eritrea.

Using the ties al-Qaida has developed, Bin Laden believes he can call upon individuals and groups virtually worldwide to conduct terrorist attacks. In December 1998, Bin Laden gave a series of interviews in which he denied involvement in the East Africa bombings but said he "instigated" them and called for attacks on U.S. citizens worldwide in retaliation for the strikes against Iraq. Bin Laden's public statements then ceased under increased pressure from his Taliban hosts. Nonetheless, in 1999, Bin Laden continued to influence like-minded extremists to his cause, and his organization continued to engage in terrorist planning. His Egyptian and South Asian allies, for example, continued publicly to threaten U.S. interests.

Security of NBC Materials

Security of weapons-usable nuclear materials in Russia is another serious concern. While the Russian government is committed to nuclear security, continuing turmoil in society, corruption and resource shortages complicate this commitment. The combination of lax security for nuclear materials at some facilities, poor economic conditions and the growing power of organized crime in Russia mean that the potential for the theft and subsequent smuggling of these materials will continue to cause concern. At the same time, the Russians have taken seriously the threat from a potential Chechen insurgent attack on a nuclear power facility and have made security upgrades.

In the past, there have been incidents of weapons-usable materials being diverted from Russian nuclear facilities. The largest seizures of such materials outside of the FSU occurred in 1994, where 2.7 kilograms of Highly Enriched Uranium (HEU) were found in the Czech Republic and about 360 grams of plutonium was seized in Germany. However, confirmed incidents of smuggling of weapons-usable nuclear materials, primarily plutonium and HEU, have declined but continued at a low rate. This decrease may be due to several factors: decreased smuggling through Western Europe, where detection is more likely; shifting of smuggling pathways through the southern tier of former Soviet states, where detection is highly unlikely; or improved security at Russian nuclear facilities.

Nevertheless, reports of theft of nuclear materials continue to emanate from the former Soviet block countries. For example, in September 1999 one kilogram of reportedly uranium-235 (enrichment unconfirmed) was seized in the Republic of Georgia. In another recent case, 10 grams of weapons-grade HEU was confiscated in Bulgaria. In addition to reports of actual nuclear materials being offered for sale, there have been numerous accounts of radioactive isotopes such as californium-252, strontium-90, and cesium-137

being stolen from industrial and research facilities. In the short run, reports of nuclear theft, whether real or scams, will continue. However, in the longer term, the implementation of the U.S.-sponsored Material Protection, Control, and Accountability Program at Russian nuclear facilities likely will lead to a reduction of the number of incidents of diversion of weapons-usable materials.

- HEU and plutonium are also being recovered from Russia's ongoing warhead elimination effort, although a considerable degree of uncertainty remains about the overall security of Russia's large inventory of nuclear material. Several programs are under way to alleviate the security problems for this material.
- First, the U.S. DOE is assisting former Soviet states with physical security improvements at nuclear facilities in an effort to institute accurate accounting procedures for nuclear materials.
- Second, pursuant to a Cooperative Threat Reduction (CTR) implementing agreement with the Russian Ministry of Atomic Energy, DoD is helping to build a state-of-the-art storage facility for long-term secure storage of HEU and plutonium from disassembled nuclear weapons. This facility is located at Mayak, about 1,400 kilometers east of Moscow near the Ural mountains.
- Third, the United States is purchasing 500 metric tons of HEU derived from disassembled Russian warheads. This material is being blended down in Russia into low-enriched uranium suitable for use in nuclear power reactors. Shipments to the United States began in 1993 and will continue over the next 20 years; as of mid-2000, about 100 tons of HEU had been transferred from Russia to the United States.
- Finally, Russia has agreed to shut down its remaining plutonium-producing reactors. DoD is assisting the Russian Ministry of Atomic Energy pursuant to a CTR implementing agreement in the conversion of reactor cores so they will not produce weapons-grade plutonium. The weapons-grade plutonium produced since January 1997 will be placed under bilateral safeguards.

Concern about security is not confined to nuclear items, but extends also to facilities in the FSU that house chemical or biological warfare-related materials. In addition, numerous scientists and technicians previously involved in key programs face severe salary reduction, complete loss of pay, unemployment. States, such as Iran, that are seeking to establish their own weapon capabilities may try to exploit the situation by attempting to recruit such individuals. However, Western programs, such as the International Science and Technology Center (ISTC), the U.S. Civilian Research and Development Foundation (CRDF), the Nuclear Cities Initiative (NCI), and the Initiatives for Proliferation Prevention (IPP) are expressly designed to address this "brain drain" problem.

Threat to Agriculture and Livestock

The potential threats to U.S. agriculture and livestock can come from a variety of pathogens and causative agents. With one in eight jobs and 13 percent of the gross national product dependent on U.S. agricultural productivity, economic stability of the country depends on a bountiful and safe food supply system. Similar to the human population, the high health status of crop and livestock assets in the United States creates a great vulnerability to attack with biological agents. Attacks against U.S. agricultural assets, might be tempting, due to the perceived relative ease of attack, the plausible deniability toward accusations, and the limited number of plant seed varieties in use. Indeed, the Soviet Union apparently planned to target U.S. agriculture and livestock as one element of a larger disruptive process and developed a range of biological agents that would be effective in this capacity.

Foot and Mouth Disease

The foot and mouth disease (FMD) virus is a member of the *Picornovirus* family, and the disease is endemic in many areas of the world. However, the United States has not dealt with the FMD virus since the 1920s. Therefore, few veterinary practitioners currently have the ability to recognize early stages of FMD infection. This agent is somewhat unique, as the animal becomes infective shortly after exposure and prior to the onset of clinical symptoms. To disseminate the agent, the mere transport of sloughed nasal vesicular tissue and modest preservation in transport could easily start an epidemic. For example, a single infected cow, or particularly a pig, can generate enough viral particles to infect vast geographical areas in a short period of time. FMD is characterized by a sudden rise in temperature, followed by an eruption of blisters in the mouth, nostrils, other areas of tender skin, and on the feet. The blisters grow larger and then break, exposing raw, eroded surfaces. Eating becomes difficult and painful, and because the soft tissues under the hoof are inflamed, the animal invariable becomes lame. Livestock raised for meat lose much weight, and dairy cattle and goats give far less milk. FMD usually kills very young animals and causes pregnant females to abort. The Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) does not permit imports of FMD sero-positive animals. Considerable progress has been made toward developing an effective vaccine against FMD, but the cost (approximately $1 billion annually) of vaccinating all susceptible animals would be prohibitive. Moreover, the vaccine would not eradicate the disease. Consequently, the slaughter and incineration of all exposed animals is the only presently effective countermeasure to FMD. During an outbreak in the United Kingdom in 1967 and 1968, ore example, more than 430,000 animals were destroyed.

Consequences of compromising the productivity and safety of the U.S. food supply are primarily economic in nature. Disrupting the supply lines for food stocks or threatening the safety of those items supplied also may erode military readiness.

Highly infectious naturally occurring plant and animal pathogens exist outside the U.S. borders and some agents are readily transported, inadvertently or intentionally, with little risk of detection. The Animal and Plant Health Inspection Service (APHIS) is the regulatory, first-response agency responsible for the diagnosis and management of all suspicious agricultural disease outbreaks. As a result of binding international agreements, select plant and animal disease outbreak confirmation, regardless of magnitude, can immediately have an impact on export trade. Depending on the agent, APHIS authority includes property seizure and total eradication of all plant or animal hosts within concentric zones of quarantine. Public trust in government and political stability can be threatened depending on the extent of disease transmission, the success of regulatory response procedures, and the duration of time to restore normalcy. Additional impacts include:

- U.S. livestock markets would be vulnerable to the causative agents of diseases including anthrax, Q fever, brucellosis, FMD, Venezuelan equine encephalitis, hog cholera, African swine fever, avian influenza, Newcastle disease, Rift Valley fever, and rinderpest.
- Soybean rust, which can easily be introduced and spreads quickly, could cause U.S. soybean producers, processors, livestock producers, and consumers to lose up to $8 billion annually, according to USDA estimates.
- An outbreak of FMD, which is also easily introduced, highly contagious, and persistent-in the U.S. livestock industry could cost as much as $20 billion over 15 years in increased consumer costs, reduced livestock productivity, and restricted trade, according to the USDA.

Foreign Livestock and Plant Pathogens which Threaten U.S. Agricultural Productivity	
Animal Disease	**Plant Disease**
Foot and Mouth Disease	Soybean Rust (Soybean Plant)
Vesicular Stomatitis	Ear Rot (Corn)
Rinderpest Gibberella	Karnal Bunt (Wheat)
African Swine Fever	Ergot (Sorghum)
Highly Pathogenic Avian Influenza	Bacterial Blight (Rice)
Rift Valley Fever	Ring Rot (Potatoes)
Lumpy Skin Disease	Wirrega Blotch (Barley)
Bluetongue	
Sheep and Goat Pox	
Swine Vesicular Disease	
Contagious Bovine Pleuropneumonia	
Newcastle Disease	
African Horse Sickness	
Classical Swine Fever	

Conclusion

The transnational nature of the threats examined in this chapter, together with the growing worldwide availability of various technologies and materials needed to make weapons, emphasizes the importance of a coordinated, broad-based response. The actions of the Aum Shinrikyo and the Usama Bin Laden groups are clear demonstrations of the dangers we face from groups that have access to critical information, expertise, and materials, as well as to ample financial backing. These groups are motivated by fanaticism and they have attempted to cause large numbers of casualties; they are not subject to the traditional moral constraints that affect nation-state actors. The possibility that such a group could acquire and use fissile, or radiological, material is one of the main reasons we are concerned about the security of nuclear materials in Russia. Poor economic conditions, growing power of organized crime, poor pay for security personnel at key nuclear facilities as well as at facilities formerly dedicated to biological and chemical warfare, and Russia's lack of enforcement of existing export controls increase the potential for the theft or smuggling of NBC-related materials. Lastly, there are a wide variety of pathogens and causative agents that, if used by a terrorist group, could pose a serious threat to U.S. agriculture and livestock. These pathogens and causative agents are readily available and can be transported easily undetected; they also could be attractive to terrorist groups, or even states of proliferation concern, because of the ease of deniability of their use.

SECTION II — DEPARTMENT OF DEFENSE RESPONSE

The potential for proliferation and use of weapons of mass destruction (WMD) — including nuclear, biological, and chemical (NBC) weapons and missiles — is one of the top security concerns for the Department of Defense (DoD). DoD has undertaken a coordinated and complementary set of responses to counter the threat.

In response to the growing WMD threat, the United States leads international efforts to develop and sustain global norms against the proliferation of NBC weapons and their delivery means. It actively engages in dialogues with states around the world to persuade them not to acquire these capabilities or to eliminate capabilities already developed. The United States also works with states to combat proliferation by assisting them in gaining and assuring greater control over sensitive dual-use equipment and technology. DoD continues to support international arms control agreements and nonproliferation regimes and to roll back proliferation through efforts such as the Cooperative Threat Reduction (CTR) program, which is facilitating the dismantlement of the WMD infrastructure in the states of the former Soviet Union (FSU).

In spite of these efforts, the threat of WMD use is a fixed part of the international security environment. The 1997 Quadrennial Defense Review (QDR) concluded that chemical and biological weapons use will be "a likely condition of future warfare." In response, the QDR directed DoD to integrate counterproliferation into every aspect of military activity, including planning, acquisition, intelligence, and international cooperation. The department has made substantial progress toward this goal since Proliferation: Threat and Response was last released.

DoD reorganized in October 1998 and consolidated many counterproliferation missions into a single organization — the Defense Threat Reduction Agency (DTRA) — whose mission is to safeguard America and its friends from weapons of mass destruction by reducing the present threat and preparing for the future threat. In addition, counterproliferation as a mission area has been fully embedded into key planning documents.

The United States' primary goal continues to be stopping proliferation. Because efforts to prevent, stop, or reverse proliferation may not always succeed, DoD is undertaking a variety of programs and activities, in coordination with other Federal departments and agencies, to deter the use of NBC weapons against U.S. and allied forces, as well as against the territories of the United States and its friends and allies. The effectiveness of these efforts will depend on close interagency coordination, close cooperation with our allies, sound program management of resources, and integration and institutionalization of the counterproliferation mission and capabilities within DoD. Through these efforts, we attempt to influence the perceptions and assessments of potential aggressors who possess NBC weapons regarding the resolve and capabilities of the United States to deal with such threats. Indeed, the knowledge that the United States has a powerful and ready nuclear capability, as well as global reach standoff precision-guided, conventional munitions, a highly trained, equipped, and motivated special operations force, and global intelligence and law enforcement, are significant deterrents to the use of these weapons.

Effective deterrence will depend on a range of nuclear and conventional response capabilities, as well as active and passive defenses, counterforce and consequence management capabilities, and supporting command, control, communications, and intelligence. In particular, military preparations for operations in an NBC environment will make clear that the threat or use of NBC weapons will not deter the United States from applying military power in defense of its national interests. The United States is substantially improving its ability to fight and win under conditions where an adversary may use asymmetric means, thereby decreasing the coercive value of NBC weapons against us and deterring adversaries from threatening or using such weapons.

DoD plays a vital role in supporting all facets of national counterproliferation policy. This section outlines steps the Department is taking to respond to the challenges of proliferation and to deal with the military

threats posed by NBC weapons. The DoD response to proliferation takes three forms: prevention/deterrence; protection of U.S. civilians and military forces if faced with the threat or use of NBC weapons, including missile defenses; and possessing the ability to respond in emergency situations where WMD are implemented.

None of these efforts alone will halt the spread and use of WMD. Together, they form a framework that allows the United States and its allies to mitigate this central, post-Cold War threat.

PREVENTION

The President's 1999 National Security Strategy points out the importance of shaping the international environment to enhance U.S. security, including through the prevention and reduction of the diverse threats we face today. To supplement diplomatic efforts to achieve this goal, the United States provides international assistance, supports arms control efforts, and engages in intelligence, law enforcement, technology transfer and export controls, and military activities. DoD is involved in each of these efforts.

International norms, rules, and standards make an important contribution to proliferation prevention. They attempt to provide an atmosphere of restraint and often are useful frameworks that include tools (e.g., inspections) relevant to impeding proliferation. These international norms, rules, and standards can be specifically incorporated into arms control agreements or they can result from informal arrangements between states.

Denial

Export control policy has two principal objectives: first, to stop — or at least retard — the transfer of those technologies that could permit states of concern to design, manufacture, or acquire NBC weapons their delivery systems, or other dangerous armaments; and, second, to monitor the flow of dual-use technologies which have legitimate commercial applications but which, if diverted or applied to military end uses, could have a negative impact on U.S. national security interests. A policy of denial involves carefully targeted export controls and the halting, where possible, of trade in weapons and technology transfers to countries of concern. These efforts are intended to prevent the acquisition of dangerous and sensitive technologies by countries that pose threats to regional or global security.

DoD security-related activities in the area of international technology transfer are coordinated by the DoD primary agent, DTRA. DoD and other concerned U.S. government agencies develop export control lists that try to identify and utilize "chokepoints" (goods and technologies important at critical stages of manufacture and application of military and dual-use items) as an effective means of control. DoD and the U.S. intelligence community actively support the export review process by identifying the key technologies that enable NBC proliferation. In addition, DoD plays a major role in controlling transfers of conventional weapons and associated dual-use technologies. These activities also help preserve critical U.S. military technological advantages while supporting legitimate defense cooperation with U.S. allies and friends. When technology is transferred to a country that does not pose a threat, DoD ensures that the transfer is done in a manner that does not endanger interests or compromise U.S. national security.

DoD/Office of Secretary of Defense — Critical Technology Program

The DoD Critical Technology Program develops and publishes the congressionally mandated list of Militarily Critical Technologies. This list is a detailed compendium of the technologies that DoD assesses as critical to maintaining superior U.S. military capabilities. It applies to all mission areas, especially efforts to counter the proliferation of weapons of mass destruction. The list is used as a technical foundation for U.S. export proposals, most notably those made within the Wassenaar Arrangement, and as a technical reference. The document is divided into three parts:

- Part I, Weapons Systems Technologies, includes those with technical performance parameters at or above the minimum level necessary to ensure continuing superior performance of U.S. military systems.
- Part II, Weapons of Mass Destruction, includes those technologies required for the development,

integration, or employment of WMD and their means of delivery.

- Part III, Developing Critical Technologies, includes those technologies which, when fully developed, will produce superior military performance or maintain a superior capability at lower cost.

The list is updated regularly to ensure key technologies are included, thus capturing new technologies applicable to proliferation concerns.

Intelligence provides critical information on how some countries attempt to acquire sensitive technologies and materials through covert procurement networks, including important information on pending or ongoing foreign shipments of critical materials. They also provide technical assessments of materials and whether they are intended for legitimate civilian use or for military applications.

Intelligence capabilities also contribute to ongoing efforts to focus and strengthen key multilateral export control regimes, as well as support diplomatic approaches and international inspections. Accurate and timely information on the activities and intentions of a country of concern can be used to build a global consensus where concerted action is necessary or desirable.

DoD also plays a leadership role in the implementation of many arms control and nonproliferation regimes. For example, DTRA conducts research to identify technologies that will ensure verification technologies used to implement arms control agreements meet stringent DoD safety and operational requirements. DTRA is also responsible for implementing inspection, escort, and monitoring requirements under the verification provisions of several U.S. treaties and agreements.

Enhanced Proliferation Control Initiative

The Enhanced Proliferation Control Initiative (EPCI) enables the U.S. government to require an export license for all items, even those not on the control list in the Export Administration Regulations, if the exporter knows, or has reason to know, that the item will be used directly or indirectly in a nuclear, missile, chemical or biological weapons program. This provision, referred to as a "catch-all" provision, is useful in addressing concerns not otherwise covered by law or regulation. The EPCI regulations supplement these controls on computers since they provide the capability to require a license for any computer, irrespective of its performance level, to any country, if destined for an end user involved in NBC weapons and/or missile development activities.

Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies

The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies came into existence in 1996. The principal objectives of the regime are to promote transparency, responsibility, and, where appropriate, restraint in the transfer of conventional weapons and sensitive dual-use goods and technologies, particularly to countries and regions of concern. These regions include areas where member states might face hostile military action. The Wassenaar Arrangement is now comprised of 33 member states, including Russia and several other former Warsaw Pact states.

Often compared to its predecessor, the Coordinating Committee for Multilateral Export Controls (COCOM), Wassenaar differs in that it does not formally target any particular country or group of countries. Members, however, can agree to take measures to prevent the acquisition of armaments and dual-use items for military end-use if a state is, or becomes, a cause for serious concern to the Wassenaar Arrangement participating states. States currently considered to be in this category are Iran, Iraq, Libya, and North Korea.

Wassenaar's basic approach includes:

- Lists of significant arms and dual-use commodities that warrant multilateral scrutiny.
- Procedures for sharing information on exports and export requests.
- Provisions to meet regularly to consult on export controls and related export policies.

DoD played a key role in the negotiations leading to the establishment of the Wassenaar Arrangement and

continues to figure prominently in the consultation sessions where problematic transfers and trends are discussed. DoD believes that the Wassenaar Arrangement fills a significant gap in multilateral export controls, complementing nonproliferation regimes such as the Missile Technology Control Regime (MTCR), the Australia Group, and the Nuclear Suppliers Group (NSG).

Biological and Toxin Weapons Convention (BWC)

The BWC, signed in 1972, entered into force in 1975. It prohibits the development, production, stockpiling, and transfer of biological weapons. The United States was an original state party to the BWC. The BWC has no provisions for verification or enforcement. However, the United States continues to work with state parties to strengthen the treaty by negotiating a legally binding protocol on compliance and transparency. The United States is promoting measures that provide increased transparency of potential biological weapons-related activities and facilities in an effort to deter violations of and enhance compliance with the BWC. The United States and other BWC states parties agreed at the 1996 Review Conference to seek to conclude a BWC protocol as soon as possible before the next review conference in November 2001. DoD participates in the BWC Ad Hoc Group negotiations, the multilateral forum in which the protocol is being developed.

Australia Group

The thirty-two nation Australia Group nonproliferation regime has developed harmonized export controls over materials and equipment that can be used to produce chemical and biological weapons. At recent plenaries, the participants reaffirmed that universal adherence to and compliance with the BWC and the Chemical Weapons Convention (CWC) will be the most effective way to rid the world of Chemical Biological Weapons (CBW). They also reaffirmed that implementing national export licensing controls on CBW-related items is an important way of meeting their national obligations under the CWC and BWC by striving to prevent the intentional or inadvertent supply by their nationals of materials or equipment to CBW programs. Participants agreed that their national CBW export controls are fully consistent and compatible with the CWC and BWC. At the last plenary, the participants again agreed to continue a program to promote greater awareness and understanding of the important role that national export licensing measures play in preventing CBW proliferation. This program will include briefings for non-Australia Group countries and regional seminars on export licensing practices with a particular emphasis on transshipment countries.

Missile Technology Control Regime (MTCR)

Created in 1987, the MTCR is an informal political understanding among states that seek to limit the proliferation of missiles capable of delivering WMD and related technology, and currently has thirty-two members (Partners). Over the course of the MTCR's thirteen-year history, the MTCR *Guidelines* and *Annex* have become the international standard for responsible missile nonproliferation behavior, and the Regime has made important strides in slowing missile proliferation worldwide. Its efforts have induced most major suppliers to responsibly control their missile-related exports and reduced the number of countries with MTCR-class missile programs. The MTCR also has facilitated international cooperation to halt numerous shipments of proliferation concern.

These successes are the result of the MTCR Partners' efforts over time to better equip the Regime to combat missile proliferation. For example, since 1993, the Partners have worked to reorient the Regime's focus from ensuring only that members have adequate export controls to taking additional steps to address the spread of missiles and related equipment and technology worldwide. In addition, the Partners increasingly engage in policy coordination and information sharing and also have established a purposeful outreach program for nonmembers. This has increased awareness of the missile proliferation threat and convinced a number of key countries, including South Korea and Israel, to unilaterally adopt MTCR controls. Moreover, through MTCR workshops, seminars, and round tables, the Partners are working side by side with non members to better understand key proliferation concerns and to develop ways to better address them.

In 1993, the Regime also broadened the scope of the MTCR *Guidelines* from their original focus on the nuclear delivery vehicles to missiles capable of delivering all types of WMD, including a new requirement to subject exports of all missiles and all MTCR Annex items to a strong presumption of denial if they are intended for WMD delivery. Furthermore MTCR partners also periodically amend the MTCR *Annex* to increase clarity and reflect technical advances, thereby ensuring the control list keeps pace with proliferation trends.

Nuclear Suppliers Group (NSG) and the Nonproliferation Treaty (NPT) Exporters (Zangger) Committee

The NSG and Zangger Committee are informal groups, comprised of over 30 countries that seek to control exports of nuclear materials, equipment, and technology, both nuclear-specific and dual-use. According to the guidelines, nuclear exports should only go to states where IAEA safeguards and/or inspections are applied. Russia is a member of both groups; China is just a member of the Zangger Committee. The United States' position is that observance of NSG and Zangger guidelines for nuclear exports by all potential suppliers, irrespective of their decision to join the groups, is crucial for controlling the flow of nuclear materials and technologies. The United States is active in reviewing the "trigger lists" of relevant technologies during the meetings of these groups and implementing the guidelines for U.S. exports.

NPT Review Conference

The Treaty on the Nonproliferation of Nuclear Weapons (NPT) entered into force in 1970. Every nation is a party to the NPT except four — Cuba, India, Israel, and Pakistan — and North Korea claims a special status, which we do not recognize. In the NPT, the nuclear weapons states (United States, United Kingdom, France, Russia, and China) agreed to not transfer nuclear weapons to any other state; transfer technologies relating to the peaceful uses of nuclear energy to NPT states parties in good standing; and eventual general and complete nuclear disarmament.

The nonnuclear weapons states agreed not to acquire nuclear weapons and to accept International Atomic Energy Agency (IAEA) verification that they use nuclear energy only for peaceful purposes. The IAEA has taken a number of important steps in recent years to strengthen its verification system. The United States continues to be a strong supporter of the NPT, IAEA, and their objectives. In 1995, the NPT parties agreed to extend the treaty indefinitely and continue to hold review conference every five years.

The 2000 NPT Review Conference opened amid widespread doubts regarding the U.S. commitment to nuclear nonproliferation and disarmament due to Senate rejection of the Comprehensive Test Ban Treaty (CTBT), United States requests to modify the Anti-Ballistic Missile (ABM) Treaty, lack of progress in the Strategic Nuclear Arms Reduction Treaty (START) process, and expectations that the United States would deploy National Missile Defense (NMD). The United States successfully resolved doubts about its support for the goals of the NPT, and the conference ended with a historic agreement. The final document, agreed by consensus, included a reaffirmation by all five nuclear weapons states to total nuclear disarmament (without a timeline); practical steps toward such nuclear disarmament; questioning of Iraqi and the Democratic Peoples Republic of Korea (DPRK) compliance with the Treaty; and a call for the four remaining nonadherents to join the treaty as nonnuclear weapons states. U.S. leadership and flexibility on nuclear disarmament and in securing a last minute agreement on the very difficult Middle East issue contributed substantially to the overall success of the conference.

Cooperative Threat Reduction (CTR)

With passage of the Soviet Nuclear Threat Reduction Act of 1991, Senators Nunn and Lugar established a farsighted program to respond to the threat of proliferation of the FSU arsenal of nuclear and chemical weapons and biological weapons materials and expertise, on the territories of several New Independent States (NIS). The legislation designated the DoD as the executive agent for what has become the CTR. Over the past nine years, Congress has authorized approximately $3.2 billion for the CTR program as part of the annual DoD budget. The CTR program is an important element of our national security strategy

for the 21st century in that the Department is pursuing the following programs in the NIS: dismantling strategic weapons and associated delivery systems; improving the security of thousands of WMD and weapons materials; preventing the proliferation of weapons technologies and technical experts; and facilitating defense and military contacts to encourage military reductions and reform.

In the FY 2000 budget submission, the President initiated the Expanded Threat Reduction Initiative (ETRI), providing an additional $1.1 billion for CTR as well as additional funds for the Departments of State and Energy. Approximately 25 percent was identified for DoD CTR program execution. The CTR program is a mechanism through which a significant percentage of the President's ETRI will be funded and executed by DoD. The Presidents' budget through the Future Year Defense Plan (FYDP) included $4.5 billion for essential U.S. assistance programs under the ETRI. Future implementation of the ETRI program will build on the security cooperation and partnerships established by DoD through the CTR program.

CTR Program Objectives

All CTR program activities are conducted to support the following five objectives:

1: Assist Russia in accelerating strategic arms reduction to Strategic Nuclear Arms Reduction Treaty (START) levels.

2: Enhance safety, security, control, accounting, and centralization of nuclear weapons and fissile material in the FSU to prevent their proliferation and encourage their reduction.

3: Assist Ukraine and Kazakhstan to eliminate START limited systems and weapons of mass destruction infrastructure.

4: Assist the FSU to eliminate and prevent proliferation of biological and chemical weapons and associated capabilities.

5: Encourage military reductions and reform and reduce proliferation threats in the FSU.

CTR Program Execution

The Department faced the challenge to establish relationships with former Cold War enemies and to create a program to effectively execute CTR funding in accordance with legislative objectives. A series of government-to-government umbrella agreements were negotiated with NIS nations to establish the legal framework for CTR assistance activities and to provide a system of rights, exemptions, and protections for U.S. assistance personnel and for CTR program activities. The agreements designate DoD as the U.S. executive agent and various ministries in recipient states as executive agents for CTR program implementation. Furthermore, umbrella agreements authorize executive agents to conclude implementing agreements, which develop more detailed terms for specified assistance projects. Umbrella agreements are in place for Russia, Ukraine, Kazakhstan, Georgia, Moldova, and Uzbekistan (Belarus has not been eligible to receive CTR assistance since 1997); others may be concluded with additional NIS states certified as eligible for CTR program assistance in the future.

DoD CTR program funding since the original Nunn-Lugar legislation has increased significantly over the intervening years. However, total CTR funding, including the recent infusion of ETRI funding, in FY 2000 remains at less than two tenths of one percent of the total Defense budget.

Past Accomplishments: Thus far, in Russia, Ukraine, Belarus, and Kazakhstan, the CTR program has been critical to the deactivation of 5,014 nuclear warheads and the elimination of the following systems (current as of 1 June 2000):

- 394 Intercontinental Ballistic Missiles (ICBMs)
- 365 ICBM silos and launch control centers
- 13 ballistic missile-carrying submarines (SSBNs)
- 256 submarine-launched ballistic missile (SLBM) launchers
- 123 SLBMs
- 62 heavy bombers

CTR is actively enhancing security for dangerous biological agents and has initiated a project to enhance

security for stored chemical weapons. The CTR program is also assisting in the design and has demonstrated proof of concept for the construction of a chemical weapons destruction facility at Shchuch'ye, Russia.

Looking to the Future: All areas of CTR's activities for the future relate directly to the above five objectives. Objective 1, assistance to Russia, reflects success in implementing the Strategic Offensive Arms Elimination program to fund the elimination of up to 31 strategic submarines and their associated missile launchers, and related projects. In the outyears, Objective 1 assistance will focus ICBM launcher elimination, ICBM missile elimination, and SLBM elimination to support START II and the Helsinki Summit implementation. We plan to assist in eliminating an additional 541 ICBMs, 105 ICBM silos and launch control centers, 23 SSBNs, 280 SLBM launchers, and 503 SLBMs.

Objective 2 assistance will sustain the Department's efforts to complete safety, security, and accounting improvements for Russian nuclear weapons at over 100 nuclear weapons storage locations, and provide secure transport of the weapons to security enhanced storage or dismantlement. DoD is also prepared to build a second wing for the Mayak fissile material storage facility, as well as more directly support the preparation of fissile material from weapons for long-term secure storage of up to 50,000 containers of fissile material, and to eliminate weapons-grade plutonium production.

Objective 3, CTR projects in Ukraine, include the elimination of 14 SS-19 and 54 SS-24 missiles, 29 missile launcher, launch control centers, and 23 bomber aircraft, and 493 air-launched cruise missiles. In addition, projects for nuclear and biological capabilities infrastructure elimination are planned in Ukraine and Kazakhstan.

Objective 4 assistance represents support for the elimination of the chemical weapons (CW) and biological capabilities of the NIS. Under the CW category in Russia, CTR is focusing on three efforts: establishing an analytical monitoring capability to support Russia's CW destruction capability, developing security enhancements for CW stockpiles, and demilitarizing former CW facilities. A fourth CW activity, the construction of a chemical weapons destruction facility at Shchuch'ye, is vital to U.S. security and nonproliferation interests. This project is subject to Congress lifting its construction prohibition and the Russian Federation agreeing to meet a variety of conditions. If the ban is lifted, CTR hopes to complete the chemical weapons destruction facility at Shchuch'ye, which is capable of destroying 500 metric tons of nerve agent per year. It would also support the President's commitment to assist Russia in eliminating these weapons and facilitate Russia's implementation of the Chemical Weapons Convention. In addition to the CW projects under this objective, Congress and the Administration have demonstrated increased support for preventing the proliferation of biological weapons and associated capabilities inherited by the states of the NIS. CTR is prepared to expand significantly its biological weapons proliferation prevention program through collaborative research, securing dangerous pathogens at a number of facilities, and dismantling capacity that is not needed for peaceful purposes.

Objective 5 funding will support a sustained DoD and military contacts program of approximately 350 annual exchanges, as requested by the U.S. Commanders in Chief (CINCs). Other program support funds continue program implementation in areas that are not unique to established projects, to include the congressionally mandated audits and examinations program.

Cooperative Threat Reduction (CTR) Program Summary

Over the years, the CTR Program has valued strong bipartisan congressional support in recognition of the fact that U.S. assistance to the FSU, implemented through the DoD CTR Program, sustains the U.S. leadership role in reducing the threat from, and proliferation of WMD in, the international community. The DoD CTR Program is considered by many as a first line of defense against the threat of unauthorized use or theft of nuclear weapons, fissile materials, or other WMD from the post-Soviet Union arsenal. It is important to note

that success, as it has in the past, cannot be achieved without established goals and objectives and full, positive Russian and other NIS cooperation and participation, including cost sharing (either direct funding or other in kind financial support). The continued, high-level commitment to CTR Program implementation by FSU nations remains essential to future U.S. and allied support. The CTR Program has been judged a program of "defense by other means," which, with a modest investment of DoD dollars, returns high payoffs in strengthened U.S. and global security.

DOD/U.S. Customs Service Counterproliferation Program

The International Border Security Counterproliferation program, authorized by the FY 1997 National Defense Authorization Act, is operated by DoD in consultation with the U.S. Customs Service. Its purpose is to train and equip customs officers and border guard officials in the FSU, Eastern Europe, and the Baltic states to prevent, deter, and investigate incidents involving the trafficking of NBC weapons and related materials.

- The objectives of the International Border Security Counterproliferation Program are:
- To assist in the continuing establishment of a professional cadre of border enforcement personnel.
- To enhance the ability of customs and border guards officials to interdict NBC weapons and related material.
- To establish a long-term and mutually beneficial working relationship between U.S. government agencies and the customs/border guard officials in participating states.

The DoD/Customs program focused initially on Southeastern Europe, including Slovenia, Romania, and Bulgaria, and supported temporary duty customs advisors in Romania and Bulgaria, as well as to the IAEA. Bringing the program into these nations complemented work carried out by U.S. Customs and other agencies elsewhere in Eastern Europe and also complemented activities under the DoD/Federal Bureau of Investigation (FBI) Counterproliferation Program. Since its inception, the program has expanded to include Kazakhstan, Kyrgyzstan, Slovakia, Georgia, Armenia, Azerbaijan, Uzbekistan, and Moldova. It should be noted that this program is exempt from Section 907 of the Freedom Support Act, which is a congressional restriction on assistance to Azerbaijan.

To date, this program has provided customs border enforcement support equipment to Kazakhstan, Uzbekistan, Georgia, and Moldova; WMD advisors to Bulgaria, Romania, and the IAEA; and advanced WMD materials detection and interdiction training to Slovakia, Bulgaria, Romania, Kazakhstan, Kyrgyzstan, Uzbekistan, Azerbaijan, Georgia, Slovenia and Armenia. This program also sponsored attendance of Azerbaijani officials at the WMD seminar held at the International Law Enforcement Academy (ILEA) in Budapest, Hungary.

Key to a country's full participation in this program is a DoD requirement to have a government-to-government counterproliferation agreement in place prior to delivery of equipment. Negotiation of these agreements serves as an opportunity to engage foreign governments in a counterproliferation dialog, help create political will within these governments to counter the proliferation of WMD and related materials, and demonstrate U.S. commitment to counterproliferation. Agreements are in place with Russia, Kazakhstan, Uzbekistan, Georgia, Moldova, Romania, and Ukraine. The agreements with Azerbaijan and Slovenia have been signed and are awaiting parliamentary ratification. WMD agreements are in various stages of negotiations with Bulgaria, Armenia, Hungary, Slovakia, Turkmenistan, and Kyrgyzstan.

DoD/Federal Bureau of Investigation (FBI) Counterproliferation Program

Congress provided authority in the FY 1995 National Defense Authorization Act for up to $10 million in reprogrammed DoD funds to develop a joint program with the FBI to expand and improve efforts to deter, prevent, and investigate incidents involving the trafficking of NBC weapons and related material. The result is the DoD/FBI Counterproliferation Program.

This program trains and equips the community of officials responsible for NBC interdiction in Eastern Europe, the Baltic States, and the FSU.

As developed jointly by DoD and FBI, the program's objectives are:

- To assist in the continuing establishment of a professional cadre of law enforcement personnel and other officials capable of interdicting and investigating NBC threats and incidents.
- To assist in developing appropriate legislation, laws, regulations, and enforcement mechanisms for deterring, preventing, and investigating NBC threats and incidents.
- To assist in building a solid, long-lasting bureaucratic and political framework in participating nations capable of implementing the above two objectives.

The program consists of three basic elements: policy consultations and assessments, training and technical assistance, and equipment procurement. In consultation with the National Security Council (NSC), it was decided that, initially, the program would focus on providing assistance to the community of officials responsible for NBC interdiction in the southern tier of the FSU, particularly Kazakhstan, Uzbekistan, and Kyrgyzstan. The program has expanded to include the Caucasus and Eastern/Central Europe.

Program activities include a two-week basic course for officials responsible for NBC interdiction, usually held at the ILEA. Also planned are specialized WMD courses, WMD practical exercises, and WMD legal/legislative seminars in the participating countries.

To date, the DoD/FBI Counterproliferation Program has conducted six large WMD basic training seminars at ILEA. These seminars are typically attended by 30-40 mid- to senior-level officials-judges and justice officials, customs, law enforcement, and national security and defense/military officials. This training has been provided to Kazakhstan, Uzbekistan, Kyrgyzstan, Georgia (two seminars), Moldova, and Slovenia. Additionally, a WMD legal dialog began with Kazakhstan and Uzbekistan through legal colloquia held in Washington. A follow-on legal workshop took place in Tashkent, Uzbekistan.

PROTECTION

DoD recognizes that a country determined to obtain NBC weapons and their delivery systems, and willing to violate global nonproliferation norms, might succeed despite the strongest prevention efforts. Because experience has shown that countries armed with NBC weapons can use these weapons to challenge U.S. security interests, U.S. forces must be prepared to deal with the military threats posed by NBC proliferation.

Protection against CBW must provide an effective defense against the complete spectrum of new or novel agents in gaseous, liquid, or solid aerosolized form that may be produced or acquired by potential enemies. This would include any agents not listed on the CWC schedules but which violate the provisions of the CWC and BWC.

The National Security Strategy

As the 1999 National Security Strategy notes, the United States must be prepared to fight and win under conditions where an adversary may use asymmetric means against us — unconventional approaches that avoid or undermine our strengths while exploiting our vulnerabilities. Because of our conventional military dominance, adversaries are likely to use asymmetric means, such as WMD, information operations, or terrorism. Such asymmetric attacks could be used to disrupt the critical logistics pipeline — from its origins in the United States, along sea and air routes, at in-transit refueling and staging bases, to its termination at airfields, seaports, and supply depots in theater — as well as our forces deployed in the field.

We are enhancing the preparedness of our Armed Forces to effectively conduct sustained operations despite the presence, threat, or use of WMD. Among these many efforts include development, procurement, and deployment of theater missile defense systems to protect forward-deployed military personnel, as well as improved intelligence collection capabilities,

heightened security awareness and force protection measures worldwide.

Integration of and Responsibilities for Counterproliferation Missions Within DoD

Counterproliferation (CP) refers to the full range of military preparations and activities to reduce, and protect against, the threat posed by nuclear, biological and chemical (NBC) weapons and their associated delivery means. Major elements of counterproliferation include: maintaining a strong deterrent; supporting diplomacy, arms control, and export control; developing capabilities to identify, characterize, destroy, and interdict the production, storage and weaponization of NBC; developing active defenses; training and equipping our forces to operate effectively in an NBC-contaminated environment; developing the ability to manage the consequences of NBC use; and encouraging our allies and coalition partners to make counterproliferation a part of their military planning.

This comprehensive CP strategy is articulated to combatant commanders through the Joint Strategic Planning System and through joint doctrine. Among key CP documents that provide strategic guidance, operational concepts and doctrinal principles to support planning for and conducting operations under CBW conditions, include CONPLAN 0400-96 (Counterproliferation of Weapons of Mass Destruction, and Joint Publication 3-11 (Joint Doctrine for Operations in Nuclear, Biological, and Chemical (NBC) Environments).

Chairman of the Joint Chiefs of Staff (CJCS) Concept Plan (CONPLAN) 0400-96 serves as the campaign plan for U.S. military efforts to counter the spread of WMD. It provides a range of options for countering the proliferation of NBC weapons during peacetime and crisis. It informs commanders of the full range of their CP responsibilities and provides guidance for conducting CP operations. CONPLAN 0400 addresses all available means, including counterforce, active defense, passive defense, and consequence management. Additionally, CJCS CONPLAN 0400 directs combatant commanders' planning to implement national-level CP policy in terms of operational objectives and supporting tasks within their areas of operations. As a part of a continuing process to improve CP activities, and consistent with Joint Strategic Planning System requirements, CJCS CONPLAN 0400 is under revision and scheduled for publication in the fourth quarter of FY 2001.

Joint Publication 3-11 sets forth principles to enable combatant commanders and subordinate joint force commanders (JFCs) and their staffs to plan for, train their forces for, and execute their assigned missions against a varied set of NBC-capable adversaries. It emphasizes that military planning to assure sustained operations in potential NBC environments must include joint, multinational and interagency dimensions. Successful combat operations in NBC environments require integrated planning and realistic training and exercises to ensure synchronized execution of all elements of military capabilities, including specific NBC defense assets. This joint doctrine is directed at strategic and operational issues, and addresses the full spectrum of military operations (including operations other than war) — peacetime preparedness and planning, transition to operations, sustained combat operations, logistics and rear area operations, health service support, conflict termination, and post-conflict operations.

Counterproliferation Council

In July 1996, the Secretary of Defense established the DoD Counterproliferation Council (CPC). Its mission is to ensure that the DoD broad counterproliferation policy objectives are being met and that the implementation of the Counterproliferation Initiative (CPI) is integrated and focused. The CPC is chaired by the Deputy Secretary of Defense and its members include the Under Secretary of Defense for Acquisition, Technology and Logistics, the Under Secretary of Defense for Policy, the Vice Chairman of the Joint Chiefs of Staff, the Under Secretaries of the military departments, the Vice Chiefs of the military services, the Director of DTRA, and the Director for Strategic Plans and Policy of the Joint Staff. The Assistant Secretary of Defense for Strategy and Threat Reduction serves as Executive Secretary for the Council. The CPC monitors departmental progress in developing

the strategy, doctrine, and forces necessary to effectively execute counterproliferation objectives, as well as DoD-wide efforts at training, exercising, and equipping U.S. forces for this task. The CPC also oversees DoD counterproliferation activities in interagency and international fora.

The CPC meets on a regular basis, focusing on the potential impact, threat, or use of NBC weapons on DoD's ability to accomplish its missions. In 2000, one of the CPC meetings addressed CINC and Service related issues focusing on how forces are organized, trained, and equipped to sustain operations under such conditions. The Council also focused on the preparations of U.S. and allied forces to sustain operations under the threat or use of CBW, issues of particular concern to U.S. Pacific Command (PACOM), U.S. Forces Korea, and U.S. Forces Japan. Another CPC meeting featured a combined Senior Readiness Oversight Council/CPC forum that addressed the topic of Chemical Biological Defense (CBD) operational standards and readiness reporting. As a result, a study group was created with the mission to identify possible improvements in existing CBD training/operational standards and readiness reporting so that the Secretary of Defense and CJCS have increased visibility into the ability of U.S. forces to fight and win in a CBW environment. With this effort, the Services and CINCs can effectively identify and address deficiencies in CBD equipment and training. After extensive research, the study groups recommended that the CINCs fully utilize the Joint Mission Essential Task List (JMETL) and Operational Plans (OPLANS)/CONPLANs to set standards and articulate requirements and also to have Office of the Secretary of Defense (OSD) and the Joint Staff facilitate Service development of CBD Concept of Operations (CONOPS).

Defense Threat Reduction Agency (DTRA)

Building on the DoD Defense Reform Initiative to improve DoD efficiency, DTRA was established in October 1998. The mission of DTRA is to safeguard America and its friends from WMD by reducing the present threat and preparing for the future threat. DTRA was established through the merger of the Defense Technology Security Administration, the Defense Special Weapons Agency, the On-Site Inspection Agency, and elements of the Office of the Secretary of Defense. More than simply the sum of its parts, DTRA brings technical and operational synergy to the full spectrum of DoD efforts to understand, prevent, deter, and defend against nuclear, biological, chemical, advanced conventional, and special weapons, thus ensuring that America and its friends remain safe in the face of present and future dangers. In the words of former Deputy Secretary John Hamre, DTRA will provide "a coherent, focused organization that will create the intellectual infrastructure for a new approach to deal with the weapons of mass destruction challenge by bringing into one organization the principal Department of Defense organizations with weapons of mass destruction expertise." This expertise encompasses technology security activities, cooperative threat reduction programs, arms control treaty monitoring and on-site inspection, force protection, NBC defense, and counterproliferation. As a combat support agency, DTRA efforts focus on providing the warfighter effective options for conducting and countering operations on the ground, often in combat situations, as well as providing products, services, and technology development to support improved military capabilities for deterring, countering, and responding to the spectrum of WMD threats.

DTRA serves as the technical and field agent on force protection, within its assigned areas of cognizance, for the CJCS. Such areas may include, but are not limited to, vulnerability assessments, technology development, and training.

DTRA Force Protection Program

On 25 June 1996, the attack on U.S. forces housed in the Khobar Towers complex in Dhahran, Saudi Arabia, changed the attitudes on the protection of U.S. personnel from terrorist attack. Prior to September 1996, there was no formal requirement for an antiterrorism/force protection (AT/FP) program at any level within the DoD. While this critical program was given high priority, there was a considerable variation in the effectiveness of AT/FP planning and evaluation. As a result of the Downing Commission Report, the Secretary of

Defense accepted responsibility for AT/FP efforts within DoD, and designated the Chairman, CJCS, as the focal point for the DoD AT/FP Program. To assist the CJCS in fulfilling his force protection responsibilities, the DTRA was designated as a combat support agency and tasked to provide integrated expertise as a catalyst to effect a change in the force protection posture within DoD. The DTRA Technology Development Directorate (which was reorganized from the Counterproliferation Support and Operations Directorate) program includes:

- Assessing DoD installations worldwide through the conduct of Joint Staff Integrated Vulnerability Assessments (JSIVA). JSIVA is a program in which installations are assessed to determine antiterrorism/force protection vulnerabilities and provides options that assist installation commanders in overcoming or mitigating those vulnerabilities.
- Providing a reachback capability and technical assistance throughout DoD to mitigate gaps in policy, doctrine, training, and education, and influence technology development.
- Conducting education and training assistance to CINCs/Services for establishment of assessment teams and improvement of core AT/FP knowledge base.
- Maintain the capability to conduct special assessments and response to worldwide incidents and crisis situations. This will include assessments of DoD and other U.S. government units at fixed facilities as well as units deployed to temporary or transient facilities.

DTRA Chemical and Biological (CB) Directorate

The DTRA CB directorate's primary mission is to develop a coordinated, jointly integrated and internationally recognized CB defense program. The program supports force protection and domestic emergency response initiatives to combat terrorist use of CB agents. Additionally, the program provides technical support for acquisition of CB defense equipment for DoD specialized response units and other federal agencies.

International Counterproliferation Cooperation

The Department continues to work with America's long-standing allies around the world to develop common approaches to chemical, biological, and nuclear defense. Notably, the United States cooperates with allies and coalition partners in Europe, the Middle East and Persian Gulf, and in Northeast Asia.

North Atlantic Treaty Organization (NATO) Counterproliferation Cooperation: Senior Defense Group on Proliferation (DGP)

DoD plays a leading role in keeping NBC defense at the top of NATO burgeoning agenda. The NATO DGP, co-chaired by the United States and a European ally (currently Denmark), was established in 1994 to address defense issues associated with the proliferation of NBC weapons and delivery means. DGP achievements represent a quiet success story for NATO and provide tangible evidence of all nineteen allies working to safeguard the alliance's military effectiveness by addressing a common security challenge. The long-term DGP program to counter emerging NBC threats was enhanced in 1999 with the adoption of a new Strategic Concept, the Weapons of Mass Destruction Initiative (WMDI), and the Defense Capabilities Initiative (DCI) launched at the summit marking the 50th anniversary of NATO.

The DGP has built consensus within NATO about NBC threats and identified improvements in capabilities needed to counter them. The DGP identified steps to accelerate the development of critical defenses and response capabilities for countering chemical and biological weapons and injected NBC defense force goals into the NATO force planning process. As part of the NATO strategic reorientation toward greater security responsibilities beyond Europe, the DGP recommended steps to improve the capabilities of allied forces operating beyond NATO periphery where the military dangers posed by NBC are greatest. To complement these recommendations, the DGP developed policy guidelines for military operations in an NBC environment that directed the revision of NATO operational doctrine, planning, training, and exercising to take account of likely chemical and biological asymmetrical threats. A 1998 "stocktaking" assessed

progress being made and set the stage for future work, including a two-day seminar on chemical and biological weapons proliferation at the group's October 1999 meeting in Mallorca, Spain.

The DGP has worked to continue NATO's progress in building strong chemical and biological defense capabilities. The DGP followed up its Mallorca seminar with a seminar in Budapest, Hungary, in July 2000 that focused specifically on biological defense. The consensus of the participants was that the DGP would work to improve NATO's preparedness against this proliferation threat. As a result, the DGP will host a second biodefense seminar in the United States in the summer of 2001 to address the unique characteristics of biodefense, in particular doctrine, capabilities, training, and exercises. The DGP is working to update its policy guidelines for military operations to address, specifically, the biological aspects of defense preparedness, and working with the various NATO groups to assess progress made in enhancing NATO's capabilities to counter future challenges Allied forces may face in operating in an NBC environment.

NATO Strategic Concept

The DGP was instrumental in the treatment of proliferation-related defense issues in the new Alliance Strategic Concept, which recognizes the direct threat to allied populations, territory, and forces posed by WMD. The Strategic Concept's guidelines for Alliance forces stress the importance of improving NATO's defense posture to reduce operational vulnerabilities, strengthen deterrence, and maintain flexibility despite the presence, threat of use, or use of NBC weapons.

WMD Initiative

The WMDI, which builds on work underway at NATO since 1994, is designed to expand the Alliance's understanding of the proliferation issue and focus appropriate political and defense attention on WMD risks. Under the WMDI, the Alliance will:

- Operate a WMD center to integrate and coordinate ongoing work to address the risks posed by WMD proliferation. The center, comprised of a multidisciplinary mixture of political, defense, intelligence, and military experts, contributes to the development of a common understanding of political and defense risks and promotes more active and regular intra-alliance debate.
- Increase information and intelligence sharing on the nature and evolution of the WMD threat to promote a better informed dialogue on WMD issues and permit development of stronger common understanding of emerging issues based on shared data. The center will maintain information in a classified WMD collection that will serve as a common resource for Alliance decision-making bodies responsible for WMD issues.
- Develop a balanced information strategy to raise public awareness of WMD issues and demonstrate strong allied support for arms control, disarmament and nonproliferation efforts that enhance overall Alliance security.
- Maintain a matrix of bilateral WMD destruction and management assistance programs as a means of avoiding overlap and identifying gaps.
- Examine ways in which NATO, which has always dealt with the possible effects of conflict on our populations, might coordinate national and collective preparations against the potential of WMD use against civilians. NATO will establish arrangements to exchange information on national capabilities for protecting civilian populations against WMD risks so that, where required, nations can cooperate in anticipation of WMD events and, if necessary, provide emergency assistance to other allies in the aftermath of a WMD attack. An inventory of national capabilities, maintained by NATO, could serve as a foundation for a coherent Alliance contribution to national civil authorities.
- Build on work undertaken by the DGP to increase military readiness to operate in a WMD environment and deter and protect against potential WMD use. NATO will accelerate NBC defense programs and research, improve WMD-related play in NATO and national training and exercises, and design a series of Biological Warfare (BW) and CW seminars to develop our collective knowledge and ability to address WMD issues effectively.

Improving NATO Counterproliferation Capabilities

From the outset, DoD has emphasized the need to embed counterproliferation as an organizing principle in every facet of Alliance defense activity. In 1996, NATO initiated a special, "fast-track" effort within its force planning process to create and approve new force goals, or planning targets, to enhance NATO forces' capability to operate in a WMD environment. These goals represent a core set of integrated capabilities that will provide a basis for improvements as NBC risks evolve. This core set of capabilities includes:

- Standoff and point BW and CW detection, identification, and warning.
- Extended integrated air defenses, including theater ballistic and cruise missile defense for deployed forces.
- NBC individual and collective protective equipment.
- Automated and deployable command, control, and communications.
- Continuous, wide-area ground surveillance.
- Strategic and operational intelligence, including early warning data.

To supplement this nucleus of capabilities, NATO is pursuing other means — including layered defenses against Theater Ballistic Missile (TBM) attack, special munitions for NBC agent defeat and hardened NBC targets, computer modeling and simulation, and medical countermeasures — to strengthen the Alliance's overall counterproliferation abilities. All of these force goals, which are now updated regularly within the NATO force planning process, should be accepted and implemented by nations to provide the best possible WMD defenses and support deterrence. The Defense Capabilities Initiative (DCI) provides strong emphasis for the acquisition of these capabilities as part of a greater Alliance effort to adapt to the challenges of the future. The DCI objective is to improve defense capabilities to ensure the effectiveness of future multinational operations across the full spectrum of Alliance missions in the present and foreseeable security environment, with a special focus on improving interoperability. The DCI provides needed political impetus for nations to implement force goals required to enhance the Alliance's defense posture against NBC weapons risks.

Bilateral Cooperation in Europe

The Department also conducts bilateral counterproliferation dialogue with European allies as part of ongoing defense consultations. Notably, in June 1998, Secretary William Cohen and then Secretary of State for Defense George Robertson called for senior-level staff talks to enhance cooperation between the United Kingdom and the United States to combat chemical and biological weapons (CBW). The Joint Venture Oversight Group (JVOG) was subsequently formed to conduct regular bilateral policy consultations regarding the preparedness of our military forces to conduct and sustain operations in a CBW environment. The JVOG seeks greater common understanding of the overall implications of the threat of use, or use, of CBW on complex combined military operations and supports enhancement of defense technical cooperation through joint consideration of policy issues to which such cooperation gives rise. It also addresses intelligence requirements and focuses operational analysis as required to address a range of policy issues. Subordinate working groups supplement the JVOG when tasked to pursue specific activities.

Middle East and Persian Gulf Cooperation

The Southwest Asia Cooperative Defense Initiative (CDI) against weapons of mass destruction is a DoD effort to enhance the ability of the states of the Gulf Cooperation Council (GCC), Jordan, and Egypt to prepare their forces to operate in a CBW environment. The CDI also seeks to improve these states' capabilities to manage the consequences of CBW use on ports, airfields, and population centers. It involves educating our coalition partners about CBW threats and available responses, identifying requirements for active and passive defenses, ascertaining the training needed to put those systems to proper use, developing realistic plans to procure equipment, and initiating and validating training programs through bilateral and multilateral exercises. The Office of Counterproliferation Policy (CPP) in OSD and U.S. Central Command are leading the initiative in close coordination with the Near East and South Asia office in OSD.

CDI activities discussed or scheduled for the coming year include: developing a system for shared early warning of ballistic missile launches, assessing the protective equipment inventories and medical response capabilities of individual countries, using international military education and training funds to send personnel to CBW defense and related schools, including military medical personnel in U.S. satellite courses on CBW casualty management, and using more CBW defense scenarios in combined exercises.

Bilateral Cooperation in the Asia-Pacific Region

DoD counterproliferation efforts in the Asia-Pacific region focus on the Republic of Korea (ROK) and Japan. These efforts are aimed at establishing an ongoing dialogue with each of these allies to discuss proliferation concerns in the region, improve military capabilities in the face of NBC threats, and identify areas for cooperation in counterproliferation programs and activities.

Korea

DoD places a high priority on counterproliferation cooperation in Korea, in particular, since it faces the greatest military threat of NBC use in the form of North Korea's considerable inventory of chemical weapons and means of delivery. The United States and the ROK have formed a Combined Counterproliferation Working Group to serve as a forum for discussion of policy issues and a source of guidance for an affiliated CP Operations Group, co-chaired by U.S. Forces Korea (USFK) and ROK Joint Chief of Staff (JCS) military experts. Several operationally focused subgroups meet regularly to improve U.S. and ROK WMD-related defense capabilities. The working groups address operational NBC defense issues associated with ground force equipment and operations, air base and sea port operations, medical defenses, modeling and simulation, and consequence management. Their focus is on practical measures to improve combined operations in a CBW environment. The ROK has demonstrated its commitment to address the threat through increased spending on CB defense capabilities for its military forces. USFK has also launched a Family and Force Protection Initiative to extend CB protection to dependants of U.S. military service members, civilian DoD employees, and their families through the distribution of protective masks and hoods.

Japan

The Tokyo subway sarin attack in March 1995 and the 31 August 1998 Taepo Dong I multi-stage missile launch over Japanese territory captured worldwide attention and led the government of Japan to steadily increase its capability to respond to NBC incidents. Under the auspices of the long-standing U.S.-Japan Security Consultation Committee, the United States and Japan are exploring opportunities for cooperation to improve both nations' consequence management and WMD defense capabilities.

ACQUISITION

The DoD Counterproliferation Initiative (CPI) is a DoD-wide effort to meet the defense challenges posed by the proliferation of NBC weapons and associated delivery systems. It was established to ensure that U.S. forces are prepared to successfully conduct military operations, even in an NBC-contaminated environment. DoD has budgeted nearly $5.8 billion in FY 2000 for Research and Development (R&D) and acquisition activities and programs directly related to countering proliferation. These investments are focused on seven key functional areas: proliferation prevention, strategic and tactical intelligence, battlefield surveillance, passive defense, active defense, counterforce; and countering paramilitary, covert delivery, and terrorist NBC threats.

The Counterproliferation Program Review Committee (CPRC)

The CPRC was established by Congress in the FY 1995 National Defense Authorization Act (NDAA). The CPRC was a follow-on effort of the earlier Nonproliferation Program Review Committee, which reviewed non-proliferation and counterproliferation efforts across the broad spectrum of Executive Branch departments and agencies. The scope of the CPRC was modified to review responsibilities on nonproliferation and counterproliferation activities and programs

of DoD, Department of Energy (DOE), and the Intelligence Community. The CPRC is chaired by the Secretary of Defense and is comprised of the Secretary of Energy (as Vice Chair), the Director of Central Intelligence, and the Chairman of the Joint Chiefs of Staff. The CPRC membership is indicative of the high-level, interdepartmental response necessary to achieve national policy and strategy objectives to counter the proliferation of NBC weapons and associated delivery systems and potential threats of NBC terrorism. The Deputy Secretary of Defense was designated by the Secretary of Defense, in a memorandum dated November 1996, to perform the duties of the Chairman of the CPRC consistent with the CPRC charter. This action served to equalize the level of representation of CPRC principals among the CPRC-represented organizations, particularly regarding DoD, where the Deputy Secretary chairs the DoD internal Counterproliferation Council.

In the 1997 NDAA, Congress extended the authority of the CPRC until the year 2004 and designated the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs (ATSD(NCB)) as the Executive Secretary of the CPRC. It also amended the purposes of the CPRC to include ensuring the development and fielding of technologies and capabilities "to negate paramilitary and terrorist threats involving weapons of mass destruction."

The CPRC Standing Committee was established in November 1996 by the CPRC. The purpose of the Standing Committee is to enable the CPRC to be more proactive in fulfilling its responsibilities under the law. It meets regularly and is actively working to perform the duties and implement the recommendations of the CPRC. The Standing Committee is comprised of the ATSD(NCB) (as Chair); the Director, Office of Nonproliferation and National Security, DOE (as Vice Chair); the Special Assistant to the DCI for Nonproliferation; the Deputy Director for Strategy and Policy, Joint Chiefs of Staff (Plans and Policy, J-5); and the Assistant Secretary of Defense for Special Operations/Low-Intensity Conflict (ASD(SO/LIC)). The Standing Committee expanded in 1999 to include the following members: the Assistant Secretary of Defense for Strategy and Threat Reduction (ASD/S&TR); the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD/C^3I); the Assistant Secretary of Defense for Reserve Affairs (ASD/RA); the Assistant to the Secretary of Defense for Civil Support (ATSD-CS); Director, Defense Advanced Research Projects Agency (DARPA); Director, Defense Threat Reduction Agency (DTRA); Director, White House Office of Science and Technology Policy; and Department of State, Director of Technology and Assessments, Bureau of Verification and Compliance (VC/TA). The decision to include these organizations was based on the recognition of their significant contributions to the overall counterproliferation mission and responsibilities embodied within the CPRC. The addition of these organizations also enhances the level of coordination within the CPRC and between the CPRC and other government organizations, such as the Interagency Weapons of Mass Destruction Preparedness Group (WMDP).

CPRC Duties and Responsibilities

Congress directed the CPRC to make and implement recommendations regarding interdepartmental activities and programs to address shortfalls in existing and programmed capabilities to counter proliferation, as well as countering paramilitary and terrorist NBC threats. A key focus of the CPRC is to eliminate redundancies and ensure the integration of DOE programs into the operational needs of DoD and the Intelligence Community. Congress also directed the committee to annually assess its actions and the status of CPRC recommendations, and to report its findings to Congress.

The CPRC annually assesses progress in addressing interagency counterproliferation needs/priorities. To assist in the process, the organization has developed Areas for Capability Enhancement (ACEs). The ACEs were established to characterize those areas where progress is needed to enhance both the warfighting capabilities of the CINCs and the overall ability to satisfy the demands of U.S. nonproliferation and counterproliferation policy. They prioritize the counterproliferation-related responses to interdepartmental policy needs and, in particular, reflect the operational requirements of the Unified Commands for countering proliferation.

A key initiative implemented by the CPRC was the establishment of working groups in three important technology areas related to countering proliferation: establishing validation standards for NBC hazard prediction models; developing an integrated R&D/acquisition plan for unattended ground sensors; and chemical and biological defense research, development, and acquisition. These working groups either provide, or participate in, fora in each of their respective areas that facilitate interagency coordination. The CPRC also closely coordinates its activities with organizations such as the Technical Support Working Group (TSWG), the Nonproliferation/Arms Control Technical Working Group (NPAC TWG), the newly established Counterproliferation Mission Support Senior Oversight Group (CP-MS SOG), the interagency Weapons of Mass Destruction Preparedness Group (WMDP), and numerous other intra-departmental or interagency organizations.

The findings and recommendations of the CPRC 2000 annual program review are presented in the Report on Activities and Programs for Countering Proliferation and NBC Terrorism, its seventh annual report to Congress, released in April 2000.

The Department of Defense Chemical and Biological Defense Program

Issues/Shortfalls

Following Operation Desert Storm, DoD identified many issues and shortfalls in supporting operations in a CB warfare environment. In its 1992 report, Conduct of the Gulf War: Final Report to Congress, DoD identified the following requirements related to CB defense capabilities:

- Lightweight CW/BW protective clothing and defensive equipment to reduce degradation, especially in desert climates.
- Integration of CW/BW protection and cooling systems into combat vehicles.
- Procurement of stand-alone transportable collective protective shelters for sustained operations in a CW/BW environment.
- Greater emphasis of BW defenses in DoD programs. Inadequacies exist in detectors, vaccines, and protective equipment.
- To ensure effective contamination avoidance on future battlefields, additional NBC reconnaissance vehicles and early warning of CB contamination.
- Continued efforts to replace the water-based decontamination system.
- Continued force modernization in individual and collective protection, medical support, detection, identification, warning, and decontamination systems to ensure survivability and mission accomplishment under CW/BW battlefield conditions.

The ability of U.S. equipment to survive and operate in an NBC environment on future battlefields continues to be a major item of concern. DoD Regulation 5000.2-R requires all mission essential systems to be survivable to those threat levels anticipated in their operating environment. The intent of this requirement is to ensure that the use of NBC weapons on a future battlefield will not disarm U.S. forces. All force modernization efforts should continue to incorporate NBC survivability in equipment designs. Failure to field NBC survivable equipment will severely degrade the ability to fight and win future conflicts. U.S. forces must be able to continue their assigned missions even in a contaminated battlespace.

Accomplishments and Initiatives

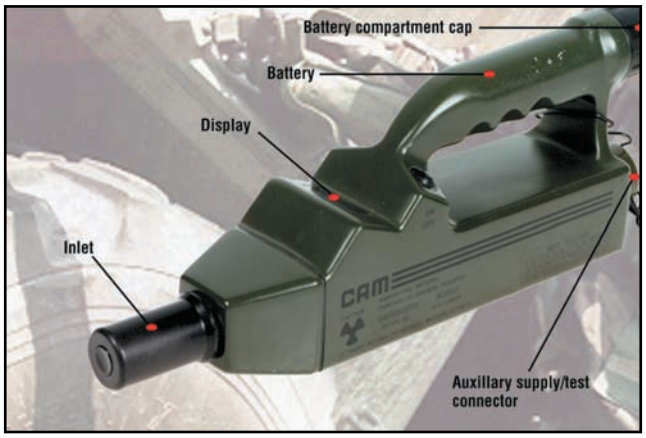
Chemical and biological defenses are conducted within the framework of four operational concepts: contamination avoidance, NBC battle management, protection, and decontamination. Contamination avoidance consists of capabilities and procedures to detect, identify, and conduct reconnaissance of the battlespace for CW/BW threats. The information from contamination avoidance systems is fed into NBC battle management systems to provide commanders with a view of the battlespace to enable them to determine appropriate protective posture and planning steps. The Joint Warning and Reporting Network (JWARN) consists of interface hardware and applications software designed to link nuclear, biological, and chemical (NBC) detection systems into command and control systems providing a near real-time NBC warning, reporting, and situational awareness capability to the warfighters. When contamination cannot be avoided, protection provides capabilities to survive, fight, and

win in an NBC contaminated environment. Protection consists of individual protection, collective protection, and medical programs. Finally, decontamination provides critical capabilities to allow the sustainment of operations in a contaminated environment. Detailed descriptions of the capabilities described in the following sections are provided in the DoD Chemical and Biological Defense Program Annual Report to Congress, March 2000.

Contamination Avoidance

Multiple systems are in development, production, or in the field for early warning or point detection of CW/BW threats. Since 1991, there have been several critical technological and operational advances. The Army and Marine Corps have fielded the M21 Remote Sensing Chemical Agent Alarm (RSCAAL) to provide standoff detection of nerve and blister agents. The hand-held Improved Chemical Agent Monitor (ICAM) provides all deployable units with a rapid and easy-to-use chemical agent monitoring and identification capability for nerve and blister agent vapors.

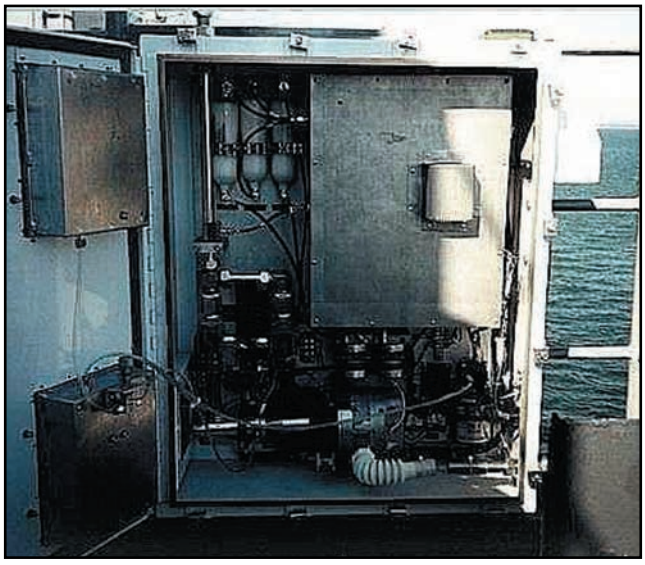
In October 1996, the Army fielded its first-ever biological defense unit equipped with state-of-the-art biological detection capabilities, the Biological Integrated Detection System (BIDS). In 1999, a second unit was fielded with the BIDS Phase II Pre-Planned Program Improvement (P3I), which provided technology insertion from concurrent development efforts to upgrade the Phase I (4-agent detection capability) core configuration to 8-agent detection capability, automated detectors, and computerized integration of detection equipment outputs.



Improved Chemical Agent Monitor (ICAM)

Biological Integrated Detection System (BIDS)

In addition, the Army has fielded the Long Range Biological Standoff Detection System (LR-BSDS), used for remote detection of aerosols and particulates. Also, the Interim Biological Agent Detector (IBAD) has been installed on selected Navy ships to provide a mobile biological point detection capability.



Interim Biological Agent Detector (IBAD)

The M93A1 NBC Reconnaissance System (NBCRS) "Fox," used by the Army and the Marine Corps, is a dedicated system for NBC detection, warning, and sampling equipment integrated into a high-speed, high-mobility armored carrier capable of performing NBC reconnaissance on primary, secondary, or cross-country routes throughout the battlefield. The NBCRS can find and mark chemical and nuclear contamination. Its crew is protected by an onboard overpressure system. It also can detect chemical contamination vapors within 5 kilometers using the M21 RSCAAL standoff detector. The NBCRS integrates contamination information from sensors with input from onboard navigation and meteorological systems. It then rapidly transmits hazard warnings via a central data processor and integrated digital jam-resistant communications.

M93A1 NBC Reconnaissance System (NBCRS) "Fox"

Several new technologies that enhance CB detection and warning have been demonstrated and are in the final stages of development. Key programs include:

- The Lightweight Nuclear Biological and Chemical Reconnaissance System (LNBCRS) provides Marine and light division field unit commanders with real-time data that can be used to assess the field for NBC hazards while on the move.
- The Joint Service Lightweight Standoff Chemical Agent Detector provides chemical agent detection and mapping of chemical agent clouds on the move, in 360 degrees, and at up to 5 kilometers in range.
- Modifications to the Joint Warning and Reporting Network (JWARN) automates NBC warning and reporting throughout the battlefield and links digital data into the Command, Control, Communication (C^3) system.
- The Joint Biological Point Detection System (JBPDS), in the final R&D stages, collects and identifies biological warfare agents and will become the biological detection suite aboard BIDS and, at the unit level, dismounted and aboard various platforms.
- The Joint Chemical Agent Detector program will provide a combined portable monitoring and small-point chemical agent detector for aircraft, shipboard, stand-alone, and individual soldier applications.

A number of procurement activities are planned within the contamination avoidance mission area:

- DoD will procure and upgrade existing BIDS with the JBPDS, which increases the detection threshold, number of agents detected, and allows for on the move detection of biological agents. In its initial configuration, JBPDS will allow the simultaneous detection of 10 agents in 20 minutes and in the follow-on, Block II variant, it will detect 26 agents.

Automatic Chemical Agent Detector/Alarm (ACADA)

- Procurement for the Automatic Chemical Agent Detector/Alarm (ACADA) will continue. The ACADA provides a point-detection capability to detect blister agents; provides improved sensitivity, improved response time, and interference rejection; and is programmable for all known CW threat agents.
- Funding continues for modifications to the NBCRS that add first-time capabilities for standoff CW agent detection using the RSCAAL and communications links to the digital battlefield.
- Procurement continues in FY 2001 for the AN/UDR-13 Pocket Radiac, which provides the first-ever capability to both detect and indicate prompt and residual radiation doses received by troops.
- Improved (Chemical Agent) Point Detection System (IPDS) for surface ships continues to be procured as a replacement to the older Chemical Agent Point Detection System and provides on-the-move, expandable point detection of CW vapors, including nerve and blister agents.
- The Portal Shield Biodetection System (XM99), formerly known as the Airbase/Port Biodetection Advanced Concept Technology Demonstration, is an interim capability for biological detection being produced and deployed for use at high-value fixed sites. The system uses an innovative network of sensors to increase the probability of detecting a BW attack.

Protection

The Chemical and Biological Defense Program (CBDP) has made significant strides in developing and fielding improved CB protection. Fielding of the Joint Service Lightweight Integrated Suit Technology (JSLIST) to all the services began in FY 1998. JSLIST is a joint Service program to field a common chemical protective ensemble (suit, boots, and gloves), that uses a selectively permeable membrane technology that eliminates the bulkiness of previous superactivated charcoal-based systems. Future improvements in individual protection will include developing protective clothing integrated into the standard duty uniform rather than requiring a separate overgarment.

Joint Service Lightweight Integrated Suit Technology (JSLIST)

A number of other procurement activities are planned within the individual protection mission area. They include:

- The M40A1 protective masks will allow continued replacement of the aging masks currently in the field.
- Additional M41 Protection Assessment Test Systems that ensure proper mask fit and functionality.
- The Army will purchase a new aircrew mask, the M45 Air Crew Protective Mask. This mask enhances flight safety and provides full compatibility with night vision goggles and weapon sighting systems while improving aircrew comfort.
- Continued procurement of the CB Respiratory System, an aircrew respiratory system for Navy and Marine Corps tactical rotary wing and land-based fixed wing aircraft.
- Procurement of the Aircrew Eye/Respiratory Protection mask, a second generation CB oxygen mask.

M40A1 Protective Masks

Within collective protection, the CBDP supports continued procurement of the Chemical Biological Protective Shelter, a highly mobile, self-contained collective protection system that can provide a contamination-free working area for medical and other units. The Navy has retrofitted the Selected Area Collective Protective System into several ships, designed collective protection into new construction in four classes of new ships and built and installed a collective Protection System, utilizing standard shipboard components, for the

Joint Operations Center U.S. Navy Central Command (NAVCENTCOM). The Advanced Integrated Collective Protective System (AICPS) is a modular system that will integrate new NBC filtration technologies with environmental controls and power source components for tactical and combat systems. AICPS provides reduced weight, size, and cost, as well as improved maintainability over current capabilities.

Decontamination

Over the past year, there have been several accomplishments in decontamination development programs. Procurement is underway for a lightweight decontamination system and a modular decontamination system that will reduce the logistics burden compared to existing systems. Significant strides have been made in replacing the existing aqueous, corrosive, and environmentally hazardous decontamination solutions with a Sorbent decontaminant. A critical shortfall in developing a decontaminant for sensitive equipment (e.g., electronics) remains with further research and development investment necessary. New concepts and technologies continue to be investigated for decontamination of large areas such as ports or airfields.

Technology Development Responsive to Counterproliferation Requirements

DoD needs a spectrum of capabilities to accomplish its counterproliferation mission. No single system or set of systems, current or proposed, can provide all of the operational capabilities needed for the complete counterproliferation mission. Just as counterproliferation has been integrated into planning for military operations, technology development directed at improving counterproliferation capabilities has been integrated into DoD R&D and other acquisition activities. Most development efforts involve the adaptation of existing systems and technologies to respond to counterproliferation mission requirements.

DoD has established procedures to ensure that its science and technology investments are directed at priority requirements identified by warfighters. To this end, DoD has designated a set of Joint Warfighting Capability Objectives (JWCOs) that focus on critical joint warfighting capabilities. Technology development in support of chemical and biological defense and protection and countering weapons of mass destruction is one of the eleven JWCOs.

Counterterror Technical Support Program

The Counterterror Technical Support (CTTS) Program develops technology and prototype equipment that address requirements having direct operational application in the national effort to combat terrorism, to include terrorist use of NBC weapons. It integrates DoD advanced development efforts with government-wide and international efforts. The Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict executes the CTTS Program, which addresses requirements identified by the Technical Support Working Group (TSWG), an interagency forum for combating terrorism. The TSWG was established as a working group of the National Security Council's Interagency Working Group on Counterterrorism and acts as its technology development component. The CTTS and TSWG focus on the rapid development of equipment to address critical multi-agency and future threat counter- and anti-terrorism requirements. A significant portion of the CTTS funding and development efforts and TSWG technology requirements are directly related to countering NBC weapons.

Counterforce Capability Against Adversary's Nuclear, Biological, and Chemical Infrastructure

The combat air forces have issued a standing mission need statement, in response to urgent warfighting CINC requirements, to detect, characterize, and defeat NBC facilities with minimal collateral effects. U.S. forces must be able to interdict an adversary's biological and chemical capability during each stage of the agent's employment. Counterforce operations include, but are not limited to, attacking agent production facilities, storage complexes, and deployed mobile weapon platforms.

The U.S. Air Force is conducting the Agent Defeat Weapon (ADW) program to develop the capability to destroy, neutralize, immobilize, or deny an adversary

access to biological and chemical agents with little or no collateral damage. The effort is currently in concept exploration. Studies are being performed to identify and evaluate concepts to satisfy the mission need, with the goal of fielding an NBC-specific strike capability. All concepts must comply with relevant arms control treaties. Analysis tools being developed to support ADW include agent release models, internal dispersion and venting models, and a lethality model to evaluate inventory and conceptual weapon effectiveness against NBC weapons and associated delivery systems.

Improved Capabilities Against Hardened Targets

Hardened targets are facilities that have been designed and constructed to make them difficult to defeat using current conventional weapons. Such facilities increasingly are being used to house NBC weapons, materials, and production capabilities. In some cases, these facilities might be used for other related support activities, e.g., command and control centers.

Hardened, fixed targets fall into two broad categories. Many are hardened by using soil, concrete, and rock boulders atop the structure once it has been built. These cut and cover facilities are often built into an excavation and then covered. The second category includes tunnels and deep shafts, where the protection is provided by existing rock and soil. There is a depth threshold at which it becomes more economical to tunnel rather than to excavate and cover. Below this threshold, costs generally are constant regardless of the depth of the tunnel below the surface, so tunneled facilities can achieve functional depths of hundreds of meters. For this reason, tunnels often are referred to as deeply buried facilities.

The limitations of weapons capabilities during the Gulf War, as well as the increasing availability of advanced tunneling technologies, have brought about a clear worldwide trend in tunneling to protect facilities. Hardened surface and cut and cover facilities may be vulnerable to current air-to-surface conventional penetrators but remain a substantial challenge when standoff attack is desired. Facilities housed in tunnels, however, are nearly invulnerable to direct attack by conventional means. For most tunneled targets, disruption must come by means other than direct weapons penetration into the facility.

Developing Improved Capabilities for Defeat of Hardened Targets

Responding to mission need statements by Air Combat Command and USSTRATCOM, DoD is conducting the Hard and Deeply Buried Target Defeat Capability (HDBTDC) program. The objective of the HDBTDC effort is to develop intelligence and conventional weapons systems capable of denying access to, disrupting operations of, or destroying defended hard and deeply buried facilities. An analysis of alternatives was performed that provided insights for future investments in penetrator weapons and intelligence. The HDBTDC effort is supported by Intelligence Community resources directed at finding and characterizing these facilities worldwide. Attaining the HDBTDC objective requires the organized efforts of the Services, DoD agencies, the Intelligence Community, and national laboratories.

The DTRA Hard Target Defeat projects are a key component of the DoD capability acquisition efforts and are an example of ongoing national technical efforts to develop the capability to defeat hard and deeply buried targets. Examples of research efforts within these projects include:

- Geomechanical modeling to identify the key aspects of geology impacting strike weapons penetration and damage propagation.
- Advanced simulation and testing to improve understanding of weapons effects and effects-target coupling.
- Development of an operations-friendly automated target planning tool for tunnel defeat.
- Development of improved capabilities to understand target characteristics and functions, facilitating the identification of specific vulnerabilities that may be exploited.

DTRA and the Defense Intelligence Agency (DIA) are embarking on a comprehensive Tunnel Defeat

Demonstration Program. The program seeks to develop, assess, and demonstrate end-to-end targeting capabilities (from detecting, identifying, and characterizing facilities to targeting, attacking, and performing damage assessment) across all warfighting options. A series of tunnel facilities, of varying design and function, will be constructed and operated at the Nevada Test Site as demonstration beds. The program will include the evaluation and demonstration of current and near-term capabilities and longer-term research initiatives.

Counterproliferation Analysis Planning System (CAPS)

CAPS provides unique Chemical Protective (CP) operations planning information to the CINCs. CAPS is a United States Strategic Command (USSTRATCOM) and DTRA program based at the Lawrence Livermore National Laboratory, California, where resident lab NBC facility engineering experts analyze NBC weapons/delivery system production/storage programs for countries of proliferation concern. They conduct nodal analysis and identify critical nodes at the country, production/support facility, and individual building levels. CAPS products are viewed by CINCs and Services in a Netscape™ format via secure computer networks.

Advanced Concept Technology Demonstrations (ACTDs)

ACTDs, a component of acquisition reform, are programs that focus mature technology on high-priority operational needs. From the inception of any ACTD, technologists work closely with warfighters to demonstrate technologies, evaluate military utility, and transition new military capabilities. ACTDs also allow the warfighter to develop and refine operational concepts to take full advantage of the new capability. They are deliberately designed to develop limited numbers of weapons and other systems that are given to the warfighting command partner at the conclusion of the effort. This delivers initial products to customers in months to a few years, as opposed to the decade-long periods required for some Cold War era system acquisition programs.

Counterproliferation Advanced Concept Technology Demonstration

The Counterproliferation ACTD develops, demonstrates, and delivers improved counterforce capabilities. DTRA serves as the lead for technology development, coordinating the contributions of multiple DoD components and the United States European Command serves as the primary operational sponsor. Priorities include improved capabilities for characterization and defeat of NBC targets, enhanced capabilities for forecasting and limiting collateral effects that might be associated with such attacks, and assisting the warfighter in the development of operational concepts.

In a conventional attack against an NBC facility, collateral effects may be due primarily to the response of the target, not the direct effects produced by the weapon; e.g., as might occur if a conventional bomb hits a chemical weapon storage bunker. Using the best experimental data available, plus lessons learned during the Gulf War, DTRA developed the munitions effectiveness assessment tool for weapons employment and combat assessments, and the hazard prediction assessment capability for prediction of collateral effects. These products have been transferred to multiple warfighting commands. The Joint Staff has recommended that they be accepted as the NATO standard for planning and assessing NBC facility attacks.

A hard-target smart fuze is being evaluated which will optimize weapons detonation location to maximize lethality with minimum collateral effects. The fuze has had several successful tests of varying types, including live drops from both Air Force and Navy aircraft against surrogate targets. An advanced unitary penetrator was demonstrated that will increase the penetration capability of a 2000-pound class warhead by a factor greater than two.

Additional development and evaluation efforts involve a new inertial terrain-aided guidance capability, a weapon-borne sensor, and tactical unattended ground sensors. Improved sensors and guidance are important as enabling conditions for better characterization of

targets and more effective and discriminate attacks against NBC facilities.

Restorations of Operations (RestOps) ACTD

Operations at fixed installations, including seaports and aerial ports of embarkation and debarkation and tactical airbases, are critical for U.S. strategic mobility and power projection. The consequences from a CB weapons attack on these essential fixed sites could seriously restrict the capability of U.S. forces to prosecute the warfight. Forces at these sites must be able to mitigate the effects of such an attack and quickly restore operational capability.

The RestOps ACTD, which began in FY 2000 and will continue through FY 2003, will demonstrate those mitigating actions taken before, during and after an attack to protect against and immediately react to the consequences of a CB attack. These actions aim to restore operating tempo in mission execution and movement of individuals and material to support combat operations at a fixed site. The RestOps ACTD user sponsor is U.S. Pacific Command; U.S. Central Command is the supporting CINC; and U.S. Forces Korea is the supporting sub-unified command. The U.S. Air Force is the lead service, and DTRA is the executing agent for RestOps. Osan Air Base is the site at which the demonstrations will be conducted, the first in February 2001. The objectives of the RestOps ACTD are:

- Integrate and demonstrate mature technologies and tools used to mitigate adverse effects and restore operations at a fixed site before, during, or after an attack of either chemical or biological weapons.
- Develop, improve, and integrate concepts of operations (CONOPS) and tactics, techniques, and procedures (TTPs) for executing RestOps contingencies at a fixed site.
- Capture lessons learned for incorporation into joint, multi-service, and service doctrine.
- Evaluate the science and technologies available to support identification of potential improvements in current U.S. policy for CONUS and OCONUS RestOps scenarios.

Additional Counterproliferation ACTDs

- The Airbase/Port Biodetection ACTD, Portal Shield, has developed and delivered a network of detection systems to protect high-value fixed sites against biological weapon attacks. Due to the success of the demonstration, DoD budged for the procurement of additional systems for installation at critical facilities on the Korean peninsula and in Southwest Asia.
- The Joint Biological Remote Early Warning System (JBREWS) ACTD, which networks several sensor types that are remotely deployed to increase warning time and minimize exposure, will finish in FY 2001. Residuals are unmanned point detection systems.

There also are non-ACTD demonstrations that are part of the chemical and biological defense program. Some focus on specific technological needs, and others are open-ended and seek to evaluate any new or emerging technology for potential CB defense application, such as the Annual Joint Field Trials at Dugway Proving Ground.

The Challenge of Developing Biological Weapons Detection Systems

Because of the dual-use nature of BW technology, it is extremely difficult to prevent BW proliferation. No matter how good individual protective equipment and collective protective structures become, their utility is limited unless there is adequate warning to mask and seek cover. This fact places a premium on developing effective battlefield BW detection systems. Currently available equipment can be broadly divided between point detection/identification systems and standoff systems. Point detection and identification of biological agents in the field is done with vehicles and shelters containing manually operated, commercial off-the-shelf technology that use reagent processes, fluidics and spectrometry. Standoff systems, which can either be stationary or mounted on platforms like helicopters, rely on Light Detection and Ranging (LIDAR) technology to spot clouds of suspect particulate matter in the atmosphere from a distance. Both types of systems are capable of providing early warning, though point

detection systems must be remotely deployed in an ensemble well upwind of friendly forces to be most effective.

The lack of sensitivity to low concentrations of biological aerosols and slow processing speed are the most critical shortcomings of our currently fielded point sensors. Since contamination can only be avoided with early warning, a sensor that reacts quickly to the earliest manifestation of a biological agent is the sine qua non of survival on the battlefield. Although an indication of the presence of agent can be provided very quickly by the Aerosol Particle Sizer (APS) component of the system, there is no way to tell whether the particles activating the trigger are harmful until the collection and identification functions are completed. This process takes from 15 to 45 minutes for high concentrations of agent. Low concentrations of agent require even longer detection cycles for the sensor systems. The extraordinary potency of these pathogens at even minute counts of agent containing particles per liter of air suggests that troops are very likely to be exposed to disease causing concentrations of them for some time before current point detection systems provide the warning to mask. But, as the impracticality of detecting to warn makes detecting to treat look like a more probable outcome of responding to a biological attack, medical technology assumes ever more importance in the attempt to counter bio warfare.

The difficulty of relying only on established technologies or BW detection can be illustrated with an example. One recently proposed system involved distributing throughout the area of operations large numbers of point particle sensors linked to a sensor network command post — essentially a computer with algorithms to sort out the implications of alarms at different locations. An analysis of this system estimated that one false alarm per week per brigade with the allotted 24 sensors would result in the average divisional soldier being masked for 15 hours a week. To achieve this low a rate, already very disruptive to operational tempo, the system could allow no more than 0.006 false alarms per sensor per day — a standard not approached by contemporary capabilities. These concerns resulted in the elimination of the particle sensing units from the system.

While the rate of improvement in sensor performance against biological materials does not at present appear particularly promising, there are some grounds for encouragement due to the rapid and steady increase in the speed of information processing. It should, in theory, be possible to increase the efficiency of detection technology by linking networks of sensors. Digitized information networks, for a start, are faster than the analog networks they are replacing, and sensors incorporating some computing ability may eventually be able to pick out critically relevant returns rather than transmitting volumes of unprocessed data.

The use of programmed algorithms to process returns in sensor network command posts has been pursued as a promising application of information processing technology to the detection and warning problem. This was the approach taken in the system discussed earlier that sought to link large numbers of particle sensors to a central unit. The hope was that this technology would permit the prediction of directional trends and speeds of agent clouds. But the potential for such systems is stunted by the stubborn limitations of the sensors themselves, and the likelihood that marginal improvements in them will be more than matched by substantial changes and improvements in the agents they are attempting to detect. Though the continual drama of advances in information technology seems to have given life to a generalized optimism about the prospects for across the board improvements in military technology, this case suggests that there are some defense problems not susceptible to the solutions offered by the information revolution.

The difficulties posed by the proliferation of biological weapons may demonstrate that, contrary to popular expectations, technical challenges do not of necessity generate increasingly ingenious technical responses in an unceasing reciprocal process. The likelihood that the detection problem will experience only gradual improvement means that some areas of technology, like information technology, may be limited in the contributions they can make to it, while others are made more important. The possibility that proliferating states may developing new agents such as modified viruses makes it desirable that the limited set of classical agents available for presumptive identification with the current

antibody-based identification technology be expanded. There are also gene-based systems in the inventory that use well-established polymerase chain reaction techniques to provide highly sensitive and specific identification of putative agents. These systems are two to three times slower than small, cheap handheld assays, and their size, weight, and power requirements have until recently been thought to render them impractical for the field. They have now been operationally deployed with encouraging results in Theater Army Medical Laboratories (TAML), where they can be operated and maintained by experienced technicians. Their identification technology is able to identify most classical agents within their incubation periods, except for the fast acting toxins. These latter agents are, in any case, more appropriately analyzed by more rapid immunoassay technologies such as the enzyme-linked immunosorbent assay (ELISA) or the even faster, more sensitive electro-chemiluminescence (ECL), both of which can be deployed with the TAML.

Medical Countermeasures for WMD Defense

DoD is committed to a force health protection strategy that will enable our most important weapons system — the individual warfighter — to survive, fight, and win in a chemical, biological, radiological, or nuclear weapons (CBRN) contaminated environment. The U.S. military also will be called upon to respond to the increased risks of nonwarfighting scenarios involving bioterrorism, environmental toxicological events, or radiological disasters. Service personnel are provided with technologically advanced and sound defenses that promote survivability and sustainability in the formidable environments resulting from adversary employment of WMD. Safe and effective vaccines, antidotes, and treatments will negate or minimize the effects of exposure to CBRN effects. Maintenance of human health through safe and effective medical countermeasures translates into the highest level of human performance despite the stress of the battlefield or other military operations involving defense against WMD.

The threat posed by the proliferation of CBRN weapons will be exacerbated with continued and more frequent deployment of U.S. forces worldwide. Therefore, it is paramount that we maintain a credible, robust capability to protect our forces and provide them with the capabilities required to operate effectively in a chemically, biologically, or radiologically contaminated environment.

Overcoming medical threats and extending human performance have been a means to significantly increase military effectiveness in the past and hold the potential to facilitate future force improvements. Medical R&D advances provide the tools to sustain unit effectiveness by conserving the fighting strength of our forces and enhancing their ability to operate despite the presence, threat of use, or use of CBRN. Medical defense, including R&D products, provide a foundation for a flexible, sustainable, and modernized force prepared to operate across the full spectrum of conflict. Integral to medical preparedness is a vigorous research program to develop more effective defenses against existing agents, endemic diseases, and new or novel agents that may be produced or acquired by potential enemies.

There are serious but not insurmountable organizational and medical obstacles to the success of post-exposure treatment. The number of known bioagents to which U.S. personnel in either Southwest Asia (SWA) and Northeast Asia (NEA) are considered most likely to be exposed is at least as high as ten. The daunting logistical prospect of procuring vaccines, prophylaxes, and other treatments for all these agents suggests, at first glance, that the availability of appropriate medical countermeasures is the first and principal limiting factor on the post-exposure strategy; and, of course, the medicines must be supplied in the right place and at the right moment to all personnel who might have been exposed. But the applicability of certain treatments to multiple diseases (doxycycline, for instance, can be used against plague, tularemia, anthrax, brucellosis, and Q-fever) would lighten the logistical burden.

The research being done to develop polyvalent or multidisease resistant vaccines could eventually make a valuable contribution to our medical countermeasures, particularly in meeting the unpredictable threat of modified viruses. But this would only be the case if scientists succeed in creating vaccines that could actually

short circuit the pathogenic mechanisms common to all agents. A limited number of conventional, single-disease vaccines (anthrax, smallpox, plague, and botulinum) should be adequate to protect U.S. forces against most biological weapons currently suitable for large-scale operational use. Though this would establish a major element of force protection, the engineering of novel viruses for military use could be a matter for increasing concern in the future.

Medical Biological Defense

Medical prophylaxes, pretreatments, and therapies are necessary to protect personnel from the toxic or lethal effects of exposure to all validated threat agents, as well as other potential threats. DoD has fielded a number of medical countermeasures that greatly improve individual protection, treatment, and diagnoses. Vaccines are the most effective and least costly protection from biological agents. There has been significant progress within the area of biological defense vaccine policy and development. The Department has established policy, responsibilities, and procedures for stockpiling biological agent vaccines and determined which personnel should be immunized and when the vaccine should be administered. DoD also has identified biological agents that constitute critical threats and determined the amount of vaccine that should be stocked for each threat. Other preventive and therapeutic measures, such as broad-spectrum antibiotics, may be used for treatment following a biological attack with bacterial agent.

The biological warfare threat of anthrax presents a potential danger to U.S. Service personnel. Anthrax is a biological warfare agent that has been produced and weaponized by adversaries of the United States. A small amount of anthrax spores, distributed under proper conditions, can generate a large number of fatalities among individuals who are not properly protected. While protective clothing and gas masks provide excellent front-line defense against anthrax and other biological agents, their effective use requires rapid and early detection of the agent. Current detection devices may not provide enough time for personnel to don protective equipment before exposure. Ideally, the United States should be able to deter the use of anthrax. As Secretary of Defense William Cohen warned in 1998, if any state "even contemplates using WMD against our forces, we will deliver a response that's overwhelming and devastating." In the event deterrence fails, however, an added level of protection must be provided to our forces. For protection against anthrax, there is a safe and effective vaccine licensed by the Food and Drug Administration (FDA).

Anthrax and Other Vaccines

On 15 December 1997, Secretary of Defense William Cohen approved the Anthrax Vaccine Immunization Program (AVIP), a plan to immunize the Total Force against anthrax. This plan was contingent on four conditions: (1) supplemental testing of anthrax vaccine lots in the stockpile to assure their potency, purity, sterility, and safety, consistent with FDA standards; (2) approval of the Services' implementation plans for execution and communication; (3) implementation of a system for fully tracking anthrax vaccinations; and (4) review of the health and medical aspects of the program by an independent expert. Each of these conditions was subsequently fulfilled, and DoD began a 3-phase anthrax vaccine immunization program in March 1998.

Phase I was initiated in August 1998, immunizing forces expected to deploy to high-threat areas. These forces include Service members and mission-essential DoD civilians assigned or deployed to Joint Staff-designated high-threat areas in SWA and NEA and surrounding waters. Phase II of the program will include immunization of Active and Reserve Component

personnel supporting early deploying forces to SWA and NEA. Phase III will immunize the remainder of the force, to include the Active and Reserve Components and new personnel. Eventually, all 2.4 million military Service members will receive the FDA-licensed anthrax immunization and subsequent annual anthrax vaccine boosters.

The AVIP initially used vaccine from the stockpile produced by the Michigan Department of Public Health. The state-owned facility and vaccine license was then sold to a private concern, the BioPort Corporation, in 1998. Plant renovations, resulting in an expanded-capability vaccine production suite, are pending FDA biologic license application supplemental approval of the new facility. However, because the stockpile is currently below that needed to continue Phase I as initially established, the scope of the vaccination effort is refocused to maintain the vaccination program in areas of the highest threat. As of November 2000, only those U.S. military personnel, emergency-essential civilian employees and contractor personnel assigned or deployed on the ground in Southwest Asia for thirty days or more are receiving the vaccine. Once assured supply of vaccine is available, Phase I will resume and eventually proceed with the subsequent phases to accomplish the vaccination of the entire force. In the meantime, the rest of our force health protection package, including the use of field detectors, protective gear, and antibiotics will remain in place.

DoD is using a vaccine that is both proven safe and effective against all known strains of anthrax. It has been approved by the FDA for nearly 30 years. To date, 13 safety studies have established the safety of the anthrax vaccine. These include focused and broad-based, and short-term and long-term studies. These studies uniformly concluded that adverse reactions associated with anthrax vaccine involve local injection site reactions or minor, transient, self-limited, systemic events like malaise, muscle ache, or headache. The anthrax vaccine clearly has a side-effect profile comparable to, or better than other known vaccines. One of the studies involves an independent civilian panel review of reports to the Vaccine Adverse Events Reporting System (VAERS). This review looks for rare, unexpected events that are temporally associated with the vaccination. At the request of DoD, the Department of Health and Human Services convened a civilian panel, the Anthrax Vaccine Expert Committee (AVEC), to review each VAERS report submitted for the anthrax vaccine. After two years, in which almost 1,200 reports and medical records have been reviewed, the AVEC continues to report that they have identified no unexpected events and no disease syndromes associated with the anthrax vaccine. More than 487,000 Service members have received over 1.9 million vaccinations and are today benefiting from this protection.

Medical Biological Defense R&D

Medical countermeasures for biological threat agents are limited but improving. A Joint Medical Biological Defense Research Program is developing countermeasures to protect U.S. forces and thereby deter, constrain, and defeat the use of biological agents. A primary objective is the development of vaccines, drug therapies, diagnostic tools, and other medical products that are effective against biological agents. Efforts are focused on maintaining the technological capability to meet present requirements and counter future threats, providing individual-level prevention and protection and providing training in medical management of biological casualties. A research program directed at the development of safe and effective antiviral drugs is also in progress. Current medical biological defense program research involves pre- and post-exposure BW countermeasures as well as diagnostics, including the following:

- Characterize the biochemistry, molecular biology, physiology, and physical structure of BW threat agents.
- Investigate the disease mechanisms and natural body defenses against BW agents.
- Determine the mechanism of action of these threat agents in animal model systems.
- Develop and compare potential vaccine candidates and characterize their effects in animal models.
- Establish safety and efficacy data for candidate vaccines.

- Develop medical diagnostics to include field confirmatory and reference laboratory techniques.
- Develop effective casualty treatment protocols using antitoxins, antibiotics, antivirals, and other pharmaceuticals to prevent death and maximize return to duty.

The Department awarded a Prime Systems Contract in November 1997 to Dynport to manage advanced development of biological defense products, obtain FDA licenses, and produce BW vaccines using the U.S. pharmaceutical industrial base. Dynport serves as an integrator for all of the processes associated with developing, licensing, producing, storing, testing, and conducting post-marketing surveillance of medical biological defense products. The prime contract approach has the advantage of flexibility and allows the market to respond to DoD requirements. Research, Development, Test, and Evaluation (RDT&E) efforts are underway to develop vaccines against all validated threat agents, including plague, smallpox, and tularemia, although it will take a number of years to successfully complete all of these vaccines.

There are a number of medical biological defense products transitioning to advanced development and in varying stages of review for licensure by the FDA. These include vaccines for botulinum and Venezuelan Equine Encephalitis (VEE), plague, brucella, Marburg (filovirus) and a common diagnostic system for rapid biological agent identification and agent prophylaxis.

Medical Biological Agent Diagnostics

The need to have diagnostic tests directed at both endemic organisms and BW agents has become more apparent, since nonspecific symptoms of naturally occurring diseases (e.g., fever, fatigue, or respiratory complaints) may be identical to initial symptoms of biological agent infection. Technological advances have allowed for the development of rapid diagnostic tests for specific biological warfare agents, to include naturally occurring and bioengineered microbial organisms.

Detectors that sample environmental organisms may not be sensitive or specific enough to identify "new" or emerging agents that have epidemic potential in a military or public health setting. In addition, with the advent of genetically manipulated variants, the need to have rapid and accurate means to determine antibiotic sensitivities, genomic sequences, and virulence factors, especially in bioengineered organisms, may become more important. Confirmatory evaluation at established reference laboratories within the United States requires a highly responsive system involving well-defined procedures in the collection, preparation, handling, and shipment of diagnostic specimens. The Theater Army Medical Laboratory (TAML) is a group of professionals who deploy before or with military units to survey and sample the environment and determine the conditions. Samples are either evaluated by the deployed team in the field or packaged and shipped to reference laboratories for additional testing.

DoD continues to identify appropriate technologies to bring the best tools to the warfighter through such institutions as the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID). Prototype systems are being developed and fielded at the installation and unit levels. The biological defense program aggressively pursues technology advances in standoff detection, remote early warning detection, sensor miniaturization, and improved agent identification sensitivity. The technologies are directed at those biological agents having the greatest impact on the individual warfighter's health and the unit's effectiveness in the conduct of military missions.

Medical Chemical Defense

The greatest chemical warfare threats to our forces are agents that affect the central nervous system and cause convulsions and respiratory failure (nerve agents), and those that have a blistering effect (e.g., mustard). The U.S. Army Medical Research Institute for Chemical

Defense provides a department focus to improve warfighter protection against chemical weapons.

MARK I Nerve Agent Antidote Kit with two autoinjectors

Protective clothing and protective masks with appropriate filters will afford protection to service personnel by preventing exposure. If an individual were to be exposed to a nerve agent, the MARK I Nerve Agent Antidote Kit with its two autoinjectors, one containing atropine and the other 2-PAM chloride, are effective counters against the physiological effects of various nerve agents and are issued to deployed forces. Three MARK I kits are issued to each individual with specific instructions on usage following exposure. A disposable autoinjector with an anticonvulsant drug (Convulsant Antidote for Nerve Agents, or CANA) is also issued to troops and is administered by a buddy following the administration of the third MARK I kit when the three MARK I kits are used. In addition, personal skin decontamination kits (M291), to be used by the individual in the event of exposure to chemical agents, are issued to the troops.

When faced with a soman or tabun nerve agent threat, another drug, known as pyridostigmine bromide (PB), is available and would be employed at the direction of the military Commander in Chief following established procedures. Soman and tabun bind very quickly and irreversibly in the body to the enzyme necessary for nerve conduction. This rapid and irreversible binding phenomenon, known as "aging," can be lessened if PB is already circulating in the body through pretreatment. PB can and does interfere with the permanent binding of these agents, and can, therefore, improve the chances for survival of exposed individuals who have not had enough time to don full protective gear with masks or were unaware of the presence of soman.

DoD is seeking FDA approval to use PB, coupled with the standard post-exposure treatment using the MARK I kits, as a pretreatment adjunct when forces are faced with the soman or tabun threat. PB has been approved for human use by the FDA as a safe and effective treatment of certain neuromuscular disorders, such as myasthenia gravis (a disease that affects neuromuscular control); however, PB has not yet been approved in the United States for human use as a nerve agent pretreatment. While it would be unethical to test PB in humans for efficacy against nerve agents, the effectiveness of PB against soman and tabun has been well-documented in animal models.

Medical Chemical Defense R&D

Critical issues of medical chemical defense include the ability to protect U.S. warfighters from the very rapidly acting nerve agents and persistent blistering agents, as well as choking and respiratory agents. A Joint Medical Chemical Defense Research program seeks to maintain the technological capability to meet present requirements and counter future threats, provide individual-level prevention and protection to preserve fighting strength, and provide medical management of chemical casualties to enhance individual survival and return to duty. Medical chemical defense R&D materiel solutions under evaluation or development include:

- CW Agent (CWA) Scavengers — Human enzymes that have been genetically engineered to destroy nerve agents are being developed.
- Advanced anticonvulsants that are water-soluble and long-acting are being evaluated for control of nerve agent-induced seizure activity.
- Reactive topical skin protectant creams are being developed that not only prevent penetration of CWA but will also destroy them.

- Antivesicants are countermeasures that provide reduction in mustard-induced tissue swelling, ocular opacity, and skin damage.
- Effects of Exposure to Non-Lethal Levels of CWA — The incidence and probability of chronic medical effects of single and multiple low-level exposures to CWA are being investigated.
- Novel Threat Agents — Current medical regimens used for protection against the conventional nerve agents are being evaluated as a countermeasures for novel threat agents.
- Cyanide Countermeasures — Medical compounds (e.g., methemoglobin formers and sulfide donors) are being evaluated for safety and efficacy as pretreatments for cyanide poisoning. An external, noninvasive, personal exposure monitor is being transitioned for development and fielding to track the levels of these cyanide pretreatment compounds.
- Chemical Casualty Management — Technologies to assist in the diagnosis, prognosis, and management of chemical casualties in a medical treatment facility are being developed.
- Respiratory Agent Injury — Mechanisms of respiratory agent injury are being determined and medical countermeasures for respiratory agent casualties are under investigation.

A medical chemical defense product coming out of the R&D program for which an FDA license is pending is the Topical Skin Protectant (SERPACWA), a barrier cream effective against nerve and vesicant agents.

Nuclear (Radiological) Defense Medical Countermeasures

The U.S. military remains vulnerable to the effects of nuclear weapons and harmful radioactive environmental contamination as U.S. forces deploy throughout the world. The core of the military's treatment and management radiological expertise resides at the Armed Forces Radiobiology Research Institute (AFRRI) in Bethesda, Maryland, a center of excellence that holds courses on the medical effects of radiation and provides consultative and response support to radiological disasters. AFFRI continues to apply the latest advances in medicine in the treatment of blood disorders, radiobiological and chemotherapy, and wound healing to the pre- and post-exposure treatment of ionizing radiation exposure.

Medical Countermeasures

Significant progress has been made in recent years within the biological, chemical, and nuclear defense medical readiness establishment. Department programs are responding to the requirements, priorities, and resources of the Services, as well as taking advantage of newly emergent technologies. Interagency collaboration to eliminate duplication of efforts will result in achieving the most effective use of limited resources. Continued congressional support and implementation of current medical defense plans will improve overall joint force readiness now and in the future.

Ballistic Missile Defense (BMD)

The Ballistic Missile Defense Organization (BMDO) is responsible for developing and fielding militarily effective ballistic missile defenses. To accomplish this mission, BMDO provides central BMD management, defines the system architecture and design, integrates requirements and technology, develops budgets and allocates resources, ensures integration with other U.S. and international defense capabilities, ensures systems are interoperable, and coordinates Theater Missile Defense (TMD) with National Missile Defense (NMD) programs and systems. BMDO is organized to develop an interoperable family of TMD systems as a tiered defensive system against adversary ballistic missiles. This missile defense approach includes lower-tier, upper-tier, and boost phase defense systems. In addition to a TMD system, BMDO is the Acquisition Executive for the NMD program. This program is an effort to develop, integrate, and deploy the necessary components to defend the United States from a limited ballistic missile attack by a country of proliferation concern. These two components are backed by an advanced technology program, which improves the performance of current or legacy systems. The advanced technologies program also leads to innovative research activities to develop the technologies necessary to keep the United States in the

forefront of missile defense technologies for future missile defense systems. BMDO also collaborates on missile defense programs with allied countries to share technologies and provide support during the development phases of these technically challenging programs.

Theater Missile Defense (TMD)

TMD is designed to protect deployed troops, allies, and friends against theater ballistic missiles (TBMs). TMD systems must be able to deploy rapidly and move with the troops. Since the TMD threat is diverse with respect to range and capability, no single system can perform the entire TMD mission. This leads to a family of systems approach to defeat successfully the theater missile threat. The family of systems approach will ensure a defense in depth, utilizing both lower-tier systems, those that intercept at relatively low altitudes within the atmosphere, and upper-tier systems, those that intercept missile targets outside the atmosphere and at longer ranges.

Lower-Tier

The U.S. lower-tier systems provide for a low-leakage defense of theater critical assets, protection of U.S. forces, friendly nations/allies, forced entry operations, and TBM defense for ports and underdeveloped theaters of operation. Lower-tier systems include PATRIOT Advanced Capabilities (PAC-3), which will replace the current PATRIOT system. The first unit will be equipped with PAC-3 starting in 4th quarter 2001. The Navy Area Defense (NAD) is expected to first enter the fleet in 1st quarter 2003 and the Medium Extended Air Defense Systems (MEADS) is projected to become operational in 2012. The NAD and PAC-3 systems provide for near-term defense through enhancement of currently fielded systems. MEADS is being developed as a follow-on system that will provide for a fully integrated 360-degree system that is strategically and tactically mobile.

PAC-3 provides the land-based, lower-tier component of the BMD architecture. This includes defending the troops and fixed assets from short- and medium-range TBMs, cruise missiles, and other air-breathing threats such as fixed or rotary wing aircraft. To accomplish this mission, the PAC-3 system is designed to be a highly advanced missile defense system that can destroy enemy threats with hit-to-kill accuracy in the terminal phase of the missile flight. The PAC-3 system is planned to be interoperable with other Army and Joint systems, to provide a seamless missile defense in depth; and be air transportable to support rapid deployments. All PAC-3 systems have four basic components: a radar set, an Engagement Control Station (ECS), a launching station, and interceptors. The radar station provides warning and tracking of incoming threats. It also provides a continuous update link with in-flight interceptors. The ECS computes fire solutions for the interceptor, and provides fire control and a communications link with other PATRIOT units. The ECS is the central nervous system of PAC-3 fire unit operations. The launch station transports, protects, and launches the missiles. The launch stations will be equipped with the PAC-3 missile, a highly maneuverable, hit-to-kill interceptor which destroys its target with a catastrophic collision.

Navy Area Defense System

The mission of the Navy Area Theater Ballistic Missile Defense system is to provide U.S. and allied forces, as well as areas of vital national interest, defense against TBMs. AEGIS cruisers and destroyers, equipped with a modified AEGIS Combat System (ACS), will detect and track short- to medium-range TBMs and engage them with the Standard Missile-2 (SM-2) Block IVA interceptor. The Navy Area Program consists of modifications to the AEGIS AN/SPY-1 radar to enable detection, tracking, and engagement of TBMs using a modified SM-2 and minor changes to existing command and control systems. The Navy will have the flexibility to forward deploy sea-based TMD forces to potential crisis spots in regions where U.S. land-based forces could not so readily deploy. This provides an effective defense capability that can be in place before hostilities erupt, or before land-based defense systems can arrive in theater. Additionally, sea-based TBM defenses will greatly alleviate the demand on our air- and sealift capabilities. This will allow the theater commander to concentrate available lift on anti-armor, tanks, troops, ammunition, and

other reinforcements needed to stop an enemy advance.

Medium Extended Air Defense System (MEADS)

The MEADS is a highly mobile, tactically deployable lower-tier system jointly being developed by the United States, Germany, and Italy to protect the maneuvering forces from multiple and simultaneous attacks from short- and medium-range ballistic missiles, low-radar cross-section cruise missiles, and other air-breathing threats. MEADS will provide 360-degrees protection of critical maneuvering force assets throughout all phases of tactical operations, while operating in the division area of the battlefield outside the umbrella of an upper-tier defense system. It will be capable of rapid deployment of a minimum battle element by C-130 aircraft, and its mobility will be commensurate with the maneuver forces. It will utilize a distributed architecture and modular components to increase survivability and flexibility of employment in a number of operational configurations. MEADS will provide increased capability against a broad threat spectrum while greatly reducing manpower and logistics requirements. When developed, MEADS will replace the current PATRIOT system.

Upper-Tier

The Theater High Altitude Area Defense (THAAD) system has upper-tier capabilities. The first unit to be equipped with THAAD is expected to be fielded by 2007 and the Navy Theater Wide (NTW) system is expected to enter the fleet in the 2010 time frame; upper-tier programs also include the Airborne Laser. These systems, combined with the lower-tier systems, provide defense in depth in theater. The upper-tier systems are designed to engage longer-range threats in a larger engagement envelope, both endoatmospheric and exoatmospheric.

Theater High Altitude Area Defense (THAAD)

The THAAD system represents a land-based, upper-tier system that will engage short-, medium- and long-range TBMs in both the endoatmosphere and exoatmosphere. THAAD's ability to intercept missiles at long range and high altitudes will give U.S. forces the best chance to shoot down incoming missiles far enough out so that post-intercept debris will not harm our troops. In addition, THAAD's endo/exocapability will typically allow multiple-shot opportunities, which increases the system's overall effectiveness. The THAAD system consists of four principal segments: interceptors, truck-mounted launchers, the THAAD radar system, and the THAAD battle management/command, control, communications and intelligence (BM/C^3I) system.

The mobile launcher will protect and transport the interceptors, in addition to firing them. Interceptors will consist of a single-stage booster and a kinetic kill vehicle that will destroy threats using hit-to-kill technology. The THAAD radar supports the full range of surveillance, target tracking, and fire control functions, and provides a communications link with THAAD interceptors in flight. The BM/C^3I system will manage and integrate all THAAD components by providing instructions and communications, and by processing sensor data. BM/C^3I systems will also link the THAAD system to other missile defense systems in theater to provide a seamless, multi-tiered, interoperable TMD architecture.

Navy Theater Wide (NTW)

The NTW TBMD system is being designed to provide an exoatmospheric intercept capability from the Navy's AEGIS weapons system. The NTW system will provide an intercept capability against medium- and long-range TBMs near the enemy TBM launch site. This happens to affect ascent phase intercepts along the TBM trajectory as it passes over water or along the coast. It will also affect midcourse intercepts near the defended area which provide descent phase intercepts to achieve an additional layer of defense for lower-tier systems. NTW will be able to take advantage of the mobility of Navy AEGIS-equipped ships and provide BMD protection to U.S. and allied forces throughout the world. This is especially important in the early stages of a conflict when land-based forces are being established in hostile environments.

The NTW system uses the AEGIS Weapon (AWS) with the newly designed Standard Missile-3 (SM-3)

missile. This missile is configured as a four-stage missile with a separating kinetic warhead (KW). The KW is guided to the threat missile system in the exoatmosphere using an infrared (IR) seeker and solid divert and attitude control systems (SDACS) to perform a direct hit-to-kill engagement. The current NTW program is performing a series of risk reduction activities (RRA). The primary RRA is the ongoing AEGIS LEAP intercept (ALI) program that will demonstrate the ability of the AWS and SM-3 to hit a TBM target in the exoatmosphere. Other risk reduction activities include the areas of lethality, propulsion, discrimination, divert, kill warhead sensor, ship systems, BM/C^3I, and systems engineering. These activities will be integrated into the NTW program as it matures into the Navy's "tactical" exoatmospheric TBMD capability.

Airborne Laser (ABL)

The ABL will be the world's first operational high energy laser weapons system when it becomes available in 2007. It is being developed for the U.S. Air Force's Air Combat Command as a TMD weapon; the ABL mission is to kill TBMs in their boost phase of flight. Boosting TBMs are easy to detect and track due to their bright plumes and are under tremendous dynamic stresses, making them vulnerable to laser weapons. Because ABL is lethal against TBMs hundreds of kilometers away, it can fly over friendly territory and kill TBMs as they are launched, giving ABL standoff capability and providing great employment flexibility. ABL will serve as a powerful deterrent to use of WMD and will help save American and allied lives in regions of conflict because destruction of TBMs early in flight can cause missile debris, including the warhead, to fall back on the aggressor. ABL engages the TBM, using its laser weapon to cause a rupture or hole in the missile's fuel tank. The result of this engagement is either a rapid leak of missile fuel or an actual catastrophic failure of the missile. In either case, the missile is defeated and falls short of its intended target. ABL will also provide quick and accurate missile launch point estimations to offensive counter-air aircraft attacking TBM launchers, assist midcourse and terminal systems by passing trajectory data on TBM "leakers," and alert passive defenses by providing early missile launch and impact warnings. ABL main armament is a flight-weighted, megawatt class (million watt) Chemical Oxygen-Iodine Laser (COIL) in the rear of the aircraft. Fourteen COIL modules make up the operational laser weapon, along with sufficient chemical fuel for 20-40 TBM kills. A sophisticated optical system transports the laser beam up to the aircraft nose, where a 1.5 meter diameter mirror in a ball turret points the beam at the target. This optical system contains low-power lasers, sensors, steering mirrors, and adaptive optics (deformable mirrors) to precisely track targets and correct atmospheric distortions, thereby increasing the high energy laser beam's intensity on target and ABL lethal range. ABL aircraft platform is a modified 747-400F. Several AN/AAS-42 Infrared Search and Track (IRST) units mounted on ABL's exterior provide 360(surveillance coverage and initial TBM target tracking out to many hundreds of kilometers. A dorsal mounted Low Altitude Navigation and Targeting Infrared Night (LANTIRN) targeting pod includes a laser range finder to compute target positions for ABL fire control and reporting to the Joint Force Air Component Commander (JFACC). The ABL crew selects and prioritizes targets for engagement according to JFACC rules of engagement, manages each individual laser firing, and communicates with outside military assets through HF and VHF/UHF/SATCOM radios and intelligence systems. First flight of the Program Definition and Risk Reduction (PDRR) ABL, with the battle management suite only, is scheduled for spring 2001. The optics and laser weapon systems will be built up and tested on the ground at Edwards Air Force Base (AFB) in FY 2001-02, then installed in the 747. First flight of the full Program Definition and Risk Reduction (PDRR) prototype will be made in spring 2002.

National Missile Defense (NMD)

The NMD program is tasked to develop, demonstrate, and, if ordered to do so, deploy an NMD system to defend all fifty states against limited strategic ballistic missile attacks from a country of proliferation concern. Should a decision be made to deploy the NMD system, DoD expects to achieve Initial Operating Capability (IOC) shortly after 2005. DoD is pursuing a fixed, land-based architecture for the NMD program, which includes five fundamental building blocks:

ground-based interceptor (GBI) consisting of a kill vehicle (KV) and a commercial off-the-shelf booster, X-Band Radar (XBR), Upgraded Early Warning Radars (UEWR), space-based sensors comprising Defense Support Program (DSP) satellites and Space Based Infrared System (SBIRS) satellites; and a Battle Management/Command, Control and Communications (BM/C^3) system.

Family of Systems/Interoperability

Some BMD activities, specifically Joint Theater Missile Defense programs, provide direct support to many separate programs. This introduces greater efficiency by accomplishing efforts that otherwise would have to be achieved separately by each program. These include interoperability in BM/C^3I, which is essential for joint and combined TMD operations.

BMDO, working with the Joint Theater Air and Missile Defense (JTAMD) organization, has developed an architecture upon which all the Services can build. This includes improving early warning and dissemination, ensuring communications interoperability, and upgrading command and control centers. In addition to BM/C^3I, the other activities include test and evaluation, modeling and simulation support, CINCs TMD Assessment program, the U.S.-Israel Arrow Deployability Program, and cooperative engagement capability analysis. These activities are critical to the success of the overall U.S. TMD system. They act as the glue that holds the architecture together and will ensure that the whole is greater than the sum of its parts.

The primary goal is to provide the warfighter with an integrated TMD capability by building in the interoperability and flexibility to satisfy a wide range of threat scenarios. From its joint perspective, BMDO oversees the various independent weapons systems development efforts and provides the timing for equipment and system integration, and analysis to integrate the multitude of sensors, interceptors, and tactical command centers into a joint theater-wide TMD architecture.

Allied Programs

The United States is collaborating on programs with allied governments to develop missile defense systems. These include the PATRIOT system with Germany and the Netherlands, the Arrow program with Israel, and MEADS with the Italian and German governments. These programs allow our allies to benefit from U.S. expertise in the area of missile defense while providing the United States with flight test data as further risk reduction measures in U.S. TMD development. This cooperation also provides the foundation for developing coalition interoperability capabilities in TMD. In addition, BMDO provides the facilities for coalition training in each of the theaters through the CINCs assessment program. Furthermore, as part of broader efforts to enhance the security of U.S., allied, and coalition forces against ballistic missile strikes and to complement U.S. counterproliferation strategy, the DoD cooperates with friends and allies on other programs to enhance TMD capability. These include shared early warning, key technology development, and cooperative planning.

Arrow Deployment Program

The United States and Israel are cooperating on the development of the Arrow interceptor and launcher and their integration with the other Israeli-developed system elements that make up the Arrow Weapon System (AWS). The Arrow interceptor is an Israeli-developed, two-stage vehicle launched from a mobile launcher that kills incoming ballistic missiles by using a blast fragmentation warhead. The Arrow has an engagement footprint somewhere between the U.S. PAC-3 and THAAD. An important objective of U.S. involvement is to foster interoperability between the AWS and U.S. TMD systems. The AWS accomplished a successful integrated, full-system intercept test against a surrogate ballistic missile on 1 November 1999. Should Israel continue to field the U.S.-built PATRIOT systems in conjunction with its deployment of the AWS, they will possess a formidable multi-tier national missile defense capability. This robust missile defense capability greatly enhances the security of an important U.S. ally and provides protection to U.S. forces, if they are deployed to the region. The Arrow initial operational capability will occur in 2000. The

first unit was stood up by the Israeli Air Force on 14 March 2000.

Advanced Technologies

The BMDO technology investment strategy is straightforward, anticipating the future missile threat and pushing technologies in response. DoD leverages other federal and industry R&D investments where appropriate to aid missile defense and integrates emerging technologies in modest systems demonstrations that seek to identify their merits. With this approach, DoD ensures that BMD technology thrusts help develop near-term improvements or technology insertions to current acquisition programs, or provide an advanced BMD capability to address evolving missile threats. The BMDO technology efforts include:

- Advanced sensor technology (focal plane arrays, laser radar, and image processing algorithms) to improve detection and tracking of missiles.
- Advanced interceptor technology (improved sensor windows, projectile structures, guidance and control, and seekers) to improve hit-to-kill capabilities.
- Directed energy (chemical laser) to provide an option of space-based, global coverage with a powerful boost phase intercept defense capability.
- Phenomenology and missile plume signature measurements to assist in readily identifying and tracking and discriminating missile threats.

Models and Simulation

BMDO uses a wide range of models and simulation tools to provide insight into the effectiveness of the BMD systems. BMDO and other organizations employ these tools to support system engineering analyses, architecture trades, and test and evaluation support for the various BMD systems.

Wargame 2000

The Wargame 2000 System development is sponsored by BMDO as a real-time, interactive, discrete event, command and control air and missile defense simulation. The Wargame 2000 System will provide a simulated combat environment that will allow warfighting commanders, their staffs, and the acquisition community to examine air and missile defense concepts of operation (CONOPS), doctrine, tactics, techniques, and procedures as an integral part of larger combat environments through the use of human-in-control experiments. The Wargame 2000 System is intended to provide a robust, flexible, easy-to-use architecture, which incorporates current and evolving weapons characteristics and threat scenarios to conduct missile and air defense investigations for both NMD and TAMD programs.

CONSEQUENCE MANAGEMENT

Consequence Management (CM) refers to actions taken to respond and assist in the mitigation of damage and collateral hazards from the deliberate employment or accidental release of chemical, biological, radiological, or nuclear materials or high-yield conventional explosive (CBRNE) weapons in a domestic or foreign environment. While DoD may provide support to domestic consequence management operations under the direction of the Federal Emergency Management Agency (FEMA) in its Lead Federal Agency (LFA) status, for a foreign consequence management operation, DoD may provide support to the Department of State (DoS) as LFA.

Domestic Consequence Management

In the event of a domestic incident on American soil resulting in the release of CBRNE, the local law enforcement, fire, and emergency medical personnel who are first to respond may become rapidly overwhelmed by the magnitude and lingering effects. In that instance, a governor may request a Presidential disaster declaration for the state and assistance from the federal government through the LFA. If DoD assistance is requested, the DoD has many unique capabilities, both technical and operational, which could support civil authorities to mitigate and manage the consequences of such an incident.

Due to the increasing volatility of the threat and time sensitivities associated with providing effective support, the Federal Response Plan assigns the FEMA as the LFA for CBRNE consequence management of a

domestic incident. The Secretary of Defense appointed an Assistant to the Secretary of Defense for Civil Support (ATSD-CS) to serve as the Department's focal point for the coordination of DoD efforts in preparation for requests for assistance from civilian agencies. Through coordination of the DoD WMD Preparedness Group, the ATSD-CS ensures that DoD efficiently marshals its consequence management resources and its many capabilities in support of the LFA in accordance with the Federal Response Plan. The ATSD-CS also represents DoD in the interagency consequence management policymaking body led by the President's National Coordinator for Security, Infrastructure Protection and Counterterrorism.

DoD Capabilities for Consequence Management

For both domestic and foreign consequence management, the Department has specially trained and equipped units capable of performing detection and decontamination, providing command and control, exercising mortuary duties, transporting contaminated personnel, performing medical functions, and operating in a CBRNE environment. Several DoD elements have a 24-hour, on-call emergency response capability with personnel trained in biological, chemical, and explosive ordnance disposal operations. These personnel perform render-safe procedures; provide damage limitation, reconnaissance, recovery, sampling, mitigation, decontamination, and transportation; and provide or recommend final disposition of weaponized and nonweaponized nuclear, chemical, and biological materials.

In recognition of the unique nature and challenges of responding to a domestic CBRNE event, the Department established a standing Joint Task Force for Civil Support (JTF-CS), subordinate to United States Joint Forces Command to provide command and control of DoD support to the LFA for CBRNE CM events in the continental United States (CONUS). On a day-to-day basis, JTF-CS will be involved in CBRNE consequence management doctrine development, training and exercise management, plans development and review, and requirements identification. The United States Pacific Command and the United States Southern Command have parallel responsibilities for providing military assistance to civil authorities for states, territories, and possessions outside CONUS. The United States Joint Forces Command, in turn, provides technical advice and assistance to geographic commanders in chief conducting consequence management operations in response to CBRNE incidents outside CONUS.

In addition, DoD has also established 27 WMD Civil Support Teams (CSTs), composed of 22 well-trained and equipped full-time National Guard personnel. Upon completion of training and certification in FY 2001, one WMD CST will be stationed in each of the ten FEMA regions around the country, ready to provide support when directed by their respective governors. Their mission will be to deploy rapidly, assist local first responders in determining the precise nature of an incident, provide expert medical and technical advice, and help pave the way for the identification and arrival of follow-on military support. Unless federalized, the CSTs will remain state National Guard assets that can be quickly accessed by proximate governors. By congressional direction, DoD is also training 17 additional WMD CSTs whose certification is anticipated in FY 2002. Congress authorized an additional five teams to be established in FY 2001. Their training and certification is also anticipated in FY 2002.

The U.S. Army Soldier Biological and Chemical Command (SBCCOM) develops technological countermeasures and equipment that provide rapid warning and facilitate quick response in the event of a chemical or biological incident. Under SBCCOM, the Edgewood Research and Development Center also maintains a rapidly deployable mobile environmental monitoring and technical assessment system, the Mobile Analytical Response System. This system provides state-of-the-art analytical assessment of chemical or biological hazards at an incident site.

On order, SBCCOM deploys the Chemical/Biological Rapid Response Team (C/B-RRT). The mission of the C/B-RRT is to coordinate and manage all DoD technical capabilities tasked to support a crisis response or consequence management operation.

Also under SBCCOM is the U.S. Army Technical Escort Unit, which is a specialized unit with missions of escorting the movement of chemical or biological material and finding and destroying chemical or biological munitions. This unit maintains a 24-hour, on-call alert team that will be tailored specifically to a current situation for both crisis and consequence management responses.

- Under the U.S. Army Medical Research and Material Command, the USAMRIID develops strategies, products, information, procedures, and training for medical defense against agents of biological origin and naturally occurring diseases of military importance that require special containment. USAMRIID has many existing capabilities that can be employed for evaluating terrorist incidents from initial communication of the threat or incident to its resolution. These capabilities include:
- Assisting in the evaluation of threat capability in relation to a specific agent or agents.
- Assisting in the evaluation of delivery methods and their impacts.
- Identifying biological agents (infectious and toxic) in samples from an incident.
- Providing special vaccines for limited numbers of personnel who respond to or are the target of such incidents.
- Handling specialized transport of a limited numbers of biological casualties under containment conditions to a receiving medical facility.

A key capability of USAMRIID is its staff of physicians, who are experienced clinicians and also understand the unique diagnostic and therapeutic challenges posed by biological warfare agents, information with which most physicians are not familiar.

Navy Explosive Ordnance Groups can be tasked to eliminate hazards from explosives that jeopardize operations conducted in support of the National Military Strategy. Navy Explosive Ordnance Disposal (EOD) detachments are structured for a relatively small footprint and rapid response in a variety of environments, both afloat and ashore, and are capable of responding to underwater and surface ordnance, nuclear, biological, chemical, and improvised explosive device (IED) threats.

U.S. Navy Environmental and Preventative Medicine Units (NEPMU) provide the occupational medicine technical expertise and assessment skills necessary to mitigate the long-term effects of a CBRNE incident but do not provide individual patient medical treatment. NEPMU deployable teams, called Chemical, Biological, Radiological and Environmental Defense (CBRED) teams, are on alert for rapid response. CBRED teams are available to advise the C/B-RRT and public health authorities and to augment other C/B-RRT medical assets.

Defense Technical Response Group (DTRG) is a deployable team of civilian DoD scientists who provide specialized one-of-a-kind equipment and on-scene technical advice to EOD operators during a CBRNE incident. DTRG also provides support to military EOD technicians in the field at all command levels. Primary duties include providing safe access routes to suspect ordnance, training, and liaison support to other agencies.

The Navy Medical Research Center Biological Defense Research Program (BDRP) defends members of the Armed Forces against a biological threat in a theater of operations. BDRP has developed a capability that consists of a transportable biological field laboratory. The field lab is composed of four basic components which combine to provide a capability to identify bacteria, viruses and toxins. Furthermore, the program conducts hand-held screening assays and immunoassays for clinical and environmental samples that can be deployed globally.

The Office of Naval Research (ONR) Naval Research Laboratory (NRL) is the Navy's corporate laboratory, which conducts multidisciplinary programs of scientific research and technology. NRL is capable of providing uniformed microbiologists specifically trained in the use of Navy Medical Research Center (NMRC) laboratory equipment and tests in order to augment NMRC. All NRL microbiologists are trained to work with chemical/biological threat agents.

The Marine Corps' Chemical Biological Incident Response Force (CBIRF) is a deployable force capable of performing chemical or biological consequence management following a terrorist attack. CBIRF has been most effective when forward deployed in response to a credible threat to domestic or overseas installations, or to protect events of national significance from the consequences of chemical/biological incidents. A panel of military and civilian experts in chemical and biological agents supports CBIRF. These experts assist in the training and development of CBIRF and are linked to CBIRF operationally through electronic communications. CBIRF is capable of deploying on short notice, as an element of the Joint Task Force-Civil Support, in support of the Federal Response Plan. CBIRF capabilities include decontaminating victims into treatable patients, stabilizing patients, and treating chemical and biological casualties.

The Air Force Radiation Assessment Team (AFRAT) consists of three separate Unit Type Codes (UTCs): Nuclear Incident Response Force (NIRF) Team 1, NIRF 2, and the Radioanalytical Assessment Team (RAT). The teams are located at Brooks Air Force Base, TX and are assigned to the Air Force Material Command (AFMC). The AFTAT NIRF 1 and 2 provide rapid global response to a wide range of radiological incidents and accidents, providing the supported medical authority rapid to ensure proper force protection. The RAT provides the supported medical authority with rapid and accurate evaluation of environmental and occupational samples. The generated data is analyzed and presented to provide the medical authority with expert guidance on effective force protection and consequence management. This UTC can deploy as a stand-alone team, or as a follow-on capability to the AFRAT NIRF teams.

Air Force medical group capabilities vary from unit to unit and, are divided between patient care, NBC medical specialty teams, medical laboratories and preventive medicine. CBRNE-CM units include the following: Medical Biological Augmentation Teams, Bioenvironmental Engineering NBC Teams, Medical Patient Decontamination Teams, Medical Theater Epidemiology Teams, Medical Infectious Disease Teams with Augmentation, Medical Nuclear Incident Response Forces, Medical Radioanalytical Assessment Teams, and Medial Radiology Augmentation Teams.

Air Force medical laboratory and technical capabilities, assets, and units are maintained at the Air Force Institute for Environment, Safety and Occupational Health Analysis (AFIERA), Brooks Air Force Base, TX. The mission of AFIERA is to enhance mission effectiveness, protect health, improve readiness, and reduce costs through the assessment and management of risks to human health and safety, operational performance, and the environment. Its capabilities include a wide range of analytical, consultative, and monitoring services focused on the assessment of operational, radiological, chemical, and biological risks to deployed populations. They also include laboratory support for the identification of biological agents of clinical concern; medical samples and select environmental samples; and analysis of numerous chemical compounds and radioactive elements in soil, vegetation, tissue, excreta, industrial materials, and air.

When requested, DoD could also contribute general assets such as mobile field hospitals, logistics, communications, civil affairs units, mortuary units, military police, search and rescue teams and chaplains.

DoD will provide its unique and extensive resources in accordance with several key principles.

First, DoD will ensure an unequivocal chain of responsibility, authority, and accountability for its actions to assure the American people that the military will follow all relevant laws when an emergency occurs. To this end, the Assistant to the Secretary of Defense for Civil Support will provide full-time civilian oversight for the domestic use of DoD CBRNE consequence management assets in support of other federal agencies.

Second, during a CBRNE event, DoD will always play a supporting role to the LFA in accordance with the Federal Response Plan and will ensure complete compliance with the Constitution, the Posse Comitatus Act, and other applicable laws. The Department routinely

provides support and assistance to civilian authorities and has considerable experience balancing the requirement to protect civil liberties on one hand with the need to ensure national security on the other.

Third, DoD CM equipment and assets are largely resident in its warfighting capabilities. However, many of these capabilities can be dual-use. Military units specializing in decontamination, medical support, logistics, transportation, and communications, for example, could assist in the domestic arena as well. DoD will also emphasize its natural role, skills, and structure in support of the LFA, such as the ability to rapidly mobilize and provide mass logistical support.

Fourth, whereas active duty forces are the U.S. forward-deployed assets overseas, DoD will employ the Army Reserve and National Guard as the forward-deployed units for consequence management in the domestic arena. In the event of a domestic CBRNE event, certain units would be able to respond rapidly due to their geographic dispersion and proximity to major American cities. Moreover, many of the applicable capabilities such as decontamination, medical support, transportation, and communications are already contained in Reserve and National Guard units.

Fifth, DoD will deconflict LFA requests for support against ongoing warfighting requirements. Before providing support, DoD will consider whether requested military capabilities are available domestically and whether the Department has the sufficient legal and budgetary authorities to provide the support to civil authorities.

In collaboration with other federal agencies, DoD has also undertaken preparatory activities. The Department has implemented the Defense Against Weapons of Mass Destruction Act of 1996 (also known as the Nunn-Lugar-Domenici Act), which required DoD to enhance the capability of federal, state, and local emergency responders regarding terrorist incidents involving CBRNE. The Domestic Preparedness Program consists of four elements: the City Train-the-Trainer Program, the Exercise Program, the Expert Assistance Program, and the Chemical Biological Rapid Response Team. Since 1996, DoD has trained over 28,000 first responder trainers in over 105 cities through the City Training Program, which also included training equipment loans to 68 cities. Consistent with the DoD role in support of the designated LFA, DoD transferred major portions of the Domestic Preparedness Program to the Department of Justice on 1 October 2001.

Foreign Consequence Management

DoD is also prepared to assist DoS in the event a CBRNE incident occurs outside the United States, its territories, or its possessions. The Under Secretary of Defense for Policy (USDP) is responsible, through the Assistant Secretary of Defense Special Operations and Low Intensity Conflict (SO/LlC), for crisis management, both domestic and abroad. ASD (SO/LIC) also serves as the principal staff assistant and advisor to the USDP and the Secretary for Defense for antiterrorism and force protection policy and ensures compliance with the DoD instruction 2000.16 entitled *DoD Combating Terrorism Program Standards*. This instruction implements policy and assigns responsibilities for all activities reporting directly to the Secretary of Defense for protection of personnel and assets from acts of terrorism.

With regard to international CM support, the Under Secretary of Defense for Policy is responsible for policy promulgation, preparedness for CM international support missions, policy oversight of operations and coordination of LFA requests for CM support. The Under Secretary of Defense for Policy will coordinate all international CM response actions with the ATSD(CS). The Chairman of the Joint Chiefs of Staff Instruction 3214.01 (CJCSI 3214.01), *Military Support to Foreign Consequence Management,* outlines the structure of the DoD response:

- Only the National Command Authorities (NCA) may order military forces to execute foreign CM missions.
- DoS is designated as the LFA for foreign CM operations in support of a foreign government not limited to a military installation.
- All DoD support will be coordinated through the responsible Chief of Mission.

- All DoD support for foreign CM operations will be provided in accordance with either a Host Nation assistance request through the DoS, approved by the NCA, and directed by DoD, or as part of an international relief effort that the NCA directs DoD to support.

The geographic combatant commands are tasked to develop CM plans, identify and train military forces to support CM operations, and, when directed, respond to foreign CBRNE incidents within its assigned areas of responsibility.

To guide combatant commanders in the planning and conduct of foreign CM operations, DoD has undertaken several initiatives:

First, DoD has undertaken a revision of CJCS CONPLAN 0400, *Counterproliferation of Weapons of Mass Destruction*. This significantly enhanced revision includes guidance to the combatant commanders for the planning and conduct of foreign CM.

Second, DoD has developed a comprehensive Foreign Consequence Management Planner's Guide. The guide contains information important to task force commanders and other tactical commanders tasked with support to CM. The Foreign Consequence Management Planner's Guide will be published early in FY 2001.

Third, DoD has developed a database listing and providing detailed information on all DoD units and assets that can support CM operations. The database and an instruction summarizing it and governing its maintenance, CJCSI 3110.16, *Military Assets and Units for Consequence Management Operations,* were published early in FY 2001, at which time DTRA assume responsibility for maintaining the database.

CONCLUSION

The proliferation and potential use of NBC weapons and their delivery means is not a hypothetical threat. More than 25 countries have, or may be developing, NBC weapons and the means to deliver them; a larger number are capable of producing such weapons, potentially on short notice. While the 1990s witnessed a considerable reduction in the threat from the countries of the FSU and the indefinite and unconditional extension of the Nuclear Nonproliferation Treaty, the security challenges posed by the continuing spread of WMD remain daunting. In addition, the NBC proliferation threat has become transnational and now has the potential to come from terrorist organizations or organized crime groups. Proliferation of NBC weapons and associated delivery systems presents a daunting challenge. The United States will need perseverance, patience, and imagination to combat this threat.

This section of the report has described in detail the three components of the DoD response to NBC proliferation — preventing proliferation from occurring, protecting U.S. forces and citizens against NBC weapons, and being able to respond against attacks by those who would use NBC weapons against the United States. Prevention of proliferation is the first priority. DoD provides critical support to national and international prevention efforts. However, DoD understands that the United States will not be successful in preventing proliferation all the time and in all places. When proliferation occurs and U.S. interests and commitments are threatened, the United States must be in a position to prevail on the battlefield, even against opponents who possess NBC weapons. DoD has unique responsibilities for the military responses needed if prevention fails: active defense, passive defense, counterforce, and countering paramilitary, covert delivery, and terrorist NBC threats.

Development of a coherent, effective national response has required policy initiatives, adaptation of military planning and operations, acquisition of new capabilities, new intelligence community programs, and international cooperation. Much progress has been made, but much more remains to be done.

ANNEX A — THREAT CHARACTERISTICS

Nuclear and Radiological

Nuclear weapons, even the simplest of the devices that have been developed by various proliferant countries, have an enormous potential for physical damage. Such weapons can destroy or damage major portions of a city or, if used in a different manner, could greatly impair the communications and electronics infrastructure of a large area. Military forces deployed against an adversary with nuclear capabilities must also take precautionary measures to try to limit the effects of a nuclear blast. Logistics centers, such as airfields and ports, are especially vulnerable because of their value as reinforcement points.

The acquisition of fissile material (highly enriched uranium or plutonium) is the key to a nuclear weapons capability. The production of fissile material, even the amount required for a very small nuclear weapons program or a research and development program, requires a significant effort on the part of the proliferant country, and the signatures of the necessary production facilities can be difficult to identify. Other nuclear threats, possibly from non-state organizations, include the theft or outright purchase of a nuclear weapon.

The threat posed by terrorist construction and deployment of a radiological dispersion device (RDD) is real, but limited. An RDD is a device designed to utilize

BIOLOGICAL WARFARE AGENTS CHARACTERISTICS

Types	Agents *	Untreated Effect	Potential for Epidemic Spread
Bacteria	Anthrax	Lethal	Negligible
	Tularemia	Incapacitant-lethal	Negligible
	Plague	Lethal	High
	Cholera	Incapacitant-lethal	High
	Glanders	Lethal	Negligible
	Clostridium Perfringens	Incapacitant	Negligible
	Brucellosis	Incapacitant	Negligible
	Shigellosis	Incapacitant	Possible
	Q Fever	Incapacitant	Possible
Toxins	Botulinum toxin	Lethal	None
	Ricin toxin	Lethal	None
	Staphylococcal Enterotoxins	Incapacitant	None
	Mycotoxins	Incapacitant-lethal	None
	Marine Neurotoxins	Incapacitant-lethal	None
	Aflatoxin	Incapacitant-lethal	None
	Bioregulatory Peptides	Incapacitant-lethal	None
Viruses	Venezuelan Equine Encephalitis	Incapacitant-lethal	Possible
	Smallpox	Lethal	Very High
	Marburg/Ebola	Lethal	Possible

* In many cases the more commonly known disease is listed rather than the actual causative agent.

radioactive material to cause disruption, damage, or injury. However, RDDs do not include nuclear weapons such as those described above. The widespread use of radioactive materials in medicine, industry, and research makes it entirely plausible that terrorists could acquire radioactive material, and the requirements for design of such a device are not beyond that of a terrorist group. The military utility of RDDs is much smaller than that of chemical and biological weapons. Historically, RDDs have been generally envisioned as having a role in attempts to achieve area denial, although cheaper and more effective substitutes are widely available.

Biological Agents

The biological warfare threat is expected to grow over the next decade as some twelve countries are now believed to have biological warfare programs, as examined in this study, and as more states, and possibly terrorist groups, develop capabilities. There is an increasing availability of biological warfare-related technology, materials, information and expertise, and publicity about potential vulnerabilities. Genetic engineering is one of a growing number of biotechnologies that could allow countries to develop agents, such as modified viruses, that would make detection and diagnosis difficult and may defeat current protection and treatment protocols. Because of the dual-use nature of all the materials needed to produce biological warfare agents, any country with the political will and a competent scientific base probably could produce agents. However, the preparation and effective use of these agents by hostile states or groups is more difficult than some popular literature suggests.

Chemical Agents

Like the threat from biological warfare, the threat from chemical warfare also could grow in the coming years. Many states have chemical warfare programs, as examined in this study, and there is a danger that these capabilities will spread to additional states. The increased availability of related technologies, coupled with the relative ease of producing some chemical agents, has increased concern that their production and use may become more attractive to states or terrorist groups in the future.

COMMON CHEMICAL WARFARE AGENTS

Types	Agents	Effects
Blister	Mustard Nitrogen Mustard Lewisite	Causes large skin blisters; respiratory damage; long-term debilitating injuries, including blindness
Choking	Phosgene	Death from lack of oxygen
Blood	Hydrogen Cyanide Cyanogen Chloride	Interferes with body's oxygen supply, causing death
Nerve	Tabun Sarin Soman Cyclosarin VX Fourth generation	Loss of muscular control, respiratory failure, and death
Other	TFNM* BZ**	Penetrates air filters; Incapacitation

*Trifluoronitrosomethane
** 3-Quinuclidinyl Benzilate

Delivery Means

Once a nation has one of these types of NBC weapons, various delivery means are available. Some of the delivery means most challenging for defenses are ballistic and cruise missiles and unconventional delivery means.

More than 25 countries worldwide possess ballistic missiles. Russia and China nuclear armed missile forces continue to present the greatest potential for catastrophic damage to the United States. However, North Korea is developing an ICBM, and Iran and Iraq may have similar ambitions. The threat from Russia will remain the most robust and lethal, considerably more so than that from China, and orders of magnitude more than the threat posed by other states. In addition, some regional states are shifting emphasis from SRBMs to MRBMs, as shown by MRBM tests in Iran, Pakistan, India, and North Korea within the last two years. However, such states may chose not to conduct robust testing programs, which may hasten the pace to early missile deployment. Because of their longer range, these newer missiles may be able to threaten a wide range of deployed U.S. and allied forces. In addition, the extended range of these missiles allows an attacker the ability to fire from points deeper within its territory.

BALLISTIC MISSILE RANGES
SRBM — less than 1,000 kilometers
MRBM — 1,000-3,000 kilometers
IRBM — 3,000-5,500 kilometers
ICBM — greater than 5,500 kilometers

Operational ballistic missiles are deployed in silos, on submarines, and on land-mobile launchers, including trucks and railcars. Mobile missiles are favored by many nations because they can be hidden, which greatly increases their survivability.

Cruise missiles are another option for delivery of NBC weapons. They may be even less expensive and more accurate than ballistic missiles, which may make them attractive to states or non-state groups. Further, they may be more difficult to defend against than manned aircraft because of their lower flight profiles and smaller radar cross-sections. While most cruise missiles now in countries' arsenals are designed for an anti-ship role, some states of concern may decide to modify the missiles for NBC delivery in the future.

> Cruise missiles usually are characterized by intended targets and launch mode, instead of maximum range. The two broadest categories are land-attack cruise missiles (LACMs) and anti-shipping cruise missiles (ASCMs). Each type can be launched from an aircraft, ship, submarine, or ground-based launcher.

Other widely available potential delivery means include artillery, multiple rocket launchers, and mortars. Aircraft, including fighters, fighter-bombers, helicopters, transport planes, and converted unmanned aerial vehicles (UAVs) also are potential delivery vehicles. Aerial sprayers can be adapted for use with many types of helicopters, UAVs, and aircraft.

Lastly, an NBC attack by unconventional means may be more attractive to either a state or a non-state actor. These may include aircraft, boats, trucks, or cars equipped with aerosol sprayers, or other improvised dissemination devices.

ANNEX B — ADHERENCE TO INTERNATIONAL TREATIES AND REGIMES FOR COUNTRIES OF CONCERN

	NPT	CTBT	NSG/ZC	BWC	CWC	AG	MTCR
China	R	S	–/M	R	R	–	*–
India	–	–	–/–	R	R	–	–
Iran	R	S	–/–	R	R	–	–
Iraq	R	–	–/–	R	–	–	–
Libya	R	–	–/–	R	–	–	–
North Korea	R	–	–/–	R	–	–	–
Pakistan	–	–	–/–	R	R	–	–
Russia	R	R	M/M	R	R	–	M
Sudan	R	–	–/–	–	R	–	–
Syria	R	–	–/–	S	–	–	–

* China has agreed to export restrictions for complete missiles but not to the MTCR technical annex that addresses exports of missile technologies.

R — Ratified | S — Signed | M — Member

Nuclear Nonproliferation Treaty (NPT)

- Nonnuclear weapon member states forswear the right to manufacture or acquire nuclear weapons. Exporting nuclear materials to nonnuclear weapon states is prohibited unless the material is safeguarded.
- Nonnuclear weapon states that are NPT members agree to International Atomic Energy Agency safeguards at all nuclear sites.

Comprehensive Nuclear Test Ban Treaty (CTBT) (has not entered into the force)

- Signatories undertake not to carry out any nuclear weapons test explosion or other nuclear explosion.

Nuclear Suppliers Group (NSG)

- Members agree informally to control exports of nuclear materials and to establish tight controls on enrichment and reprocessing technologies.

Zangger Committee (ZC)

- Developed list of safeguarded trigger items that NPT members will export only to facilities under IAEA safeguards.

Australia Group (AG)

- Informal group whose members have adopted export controls on specific chemical precursors, microorganisms, and related production equipment with chemical and biological weapons applications.

Biological and Toxin Weapons Convention (BWC)

- Bans development, production, stockpiling, retention, or acquisition of biological agents or toxins that have no justification for peaceful purposes.
- Treaty in force but has no verification or monitoring mechanisms.

Chemical Weapons Convention (CWC)

- Bans chemical weapons development, production, stockpiling, transfer and use.
- Requires adherents to declare and destroy stockpiles and production plants within 10 years. Entered into force in April 1997.

Missile Technology Control Regime (MTCR)

- Voluntary regime with 32 members states; no control over nonmembers; no enforcement authority.
- Main goal is to halt or slow the spread of missiles and UAVs that can deliver a 500-kilogram or larger payload to 300 or more kilometers.
- Members agreed to control two categories of exports related to missile development, production, and operation:
  - Category I: whole missiles and UAVs with 500 kilometer/300 kilometer payload/range; and complete subsystems such as guidance and engines.
  - Category II: equipment and technology related to warheads and re-entry vehicles, missile engines, guidance technology, propellants and missile and UAVs with a 300km range but less than a 300 kilometer payload.

ANNEX C — BIOLOGICAL WEAPONS DETECTION TECHNOLOGY

All BW detection systems currently fielded or in testing need additional work on their detection algorithms and require manual interpretation of raw data. The technical challenges of interrogating particle clouds for biological content are considerable and will require large increases in weight and power consumption that may lessen the operational attractiveness of the short-range detection systems.

Point detectors can only sense biological agents when they are enveloped in the aerosol plume. The process through which they must go to provide reliable warning of the presence of an agent is similar in most fielded systems. Air is first sucked into a component known as an Aerosol Particle Sizer (APS). This device sizes and counts particles to determine if there has been a change in the aerosol background that might indicate the presence of an agent. The APS functions as a trigger to initiate the next stage of analysis, generally referred to as detection. This is often performed by examining the intake for biological fluorescence, a process combined in newer equipment with the triggering function.

The point detector proceeds to the identification stage of analysis when it is satisfied that there is a high probability of the presence of suspect biological material. This determination is made in most systems when two networked sensors are able to reach a kind of mathematical consensus about the significance of their intake, which can only happen if the sensors detect increased particulate material within a period of time allowed by an algorithm that is based on wind speed and direction. The systems then inject and analyze their intake.

In the final stage of the detection cycle, a suspect aerosol is concentrated and analyzed to arrive at a presumptive identification. The intake is typically suspended in buffered water and run over a ticket containing a reagent, usually an antibody. If no agent is identified, the sample is dumped. A presumptive identification, which is usually limited to a preselected set of agents, allows a general warning to be issued and provides the basis for forensic analysis of the agent sample. It is possible that the presence of an agent at levels that are low, but still sufficient to cause infection, may trigger the detection algorithm and then be dumped because the system is not sensitive enough to make an identification at low levels of concentration. Additionally, the identification technologies tend not to have internal controls to monitor whether the assays they perform are reacting correctly.

The near- and mid-term approaches to remedying these deficiencies tend to be incremental or to involve multiplication and reorganization of the sensor system components. The magnitude of the increases in sensitivity and speed that would be provided by such solutions, which often involve unacceptable tradeoffs, is insufficient to lessen significantly the likelihood of exposure to biological agents that are currently recognized and understood. The near certainty that more potent and elusive agents are now under development and will soon be weaponized amplifies the gravity of the challenge.

There are more novel approaches to the problem of identification that may yet hold some promise for the eventual attainment of effective solutions. The Defense Advanced Research Projects Agency (DARPA) has two such programs. One involves the development of technologies that use up-converting phosphors to improve detection sensitivity and enhanced multiplexing to reveal on a single chip the family, genus, and species of a biological agent. In this project, called the BW Defense Environmental Sensors Program, a miniaturized and ruggedized mass spectrometer is also being developed to identify biological agents without the use of fluids and consumables. These environmental sensors are intended to operate automatically so that they can be left unattended on the battlefield.

In another experimental project known as the Tissue-Based Biosensors Program, DARPA is exploring the use of biological cells and tissues as detector components for sensors that will report both biological and

chemical toxins. The reaction of biosensors provides information about the mechanisms and activity of a wide spectrum of agents, whether they are living or dead, or have been bioengineered and are currently undetectable by other means, such as antibodies and nucleic acid sequencing. The program has a number of challenges to overcome and is currently focusing on engineering cells and tissues to satisfy sensor performance requirements and fabricate prototype devices for testing.

While point detection systems have a large role in countering the use of bioagents, standoff systems also make an important contribution to detection. The Light Detection and Ranging (LIDAR) technology of these systems projects electromagnetic beams to illuminate aerosolized clouds of particulate matter, producing return radiation that can be evaluated for particle size and density, as long as the line of sight between sensor and target is unobstructed. Systems that use infrared wavelengths can detect particulate matter at distances as great as 30 to 50 kilometers, but cannot distinguish between biological particles and materials of nonorganic origin. Systems that rely on ultraviolet wavelengths cause organic components in airborne materials, such as proteases, to fluoresce, and are thus able to distinguish biological aerosols from dust and other contaminants. The range of these systems, however, is limited to a few kilometers at best due to the relative opacity of air to ultraviolet light.

The infrared standoff capability is able to spot what is arguably the most disastrous contingency foreseeable in biological warfare, the long line release. But the impossibility of distinguishing with infrared returns, biological from nonbiological particles, and the great distance at which the clouds can be spotted, give rise to a collection of associated difficulties in employing the long-range asset. The particle clouds that can be detected at distances measuring in the tens of kilometers are of a size that could envelop very large units upon their eventual arrival. But at such distances, it is difficult to predict when and where the suspect clouds will arrive along a corps or divisional frontage. The decision to go into a protective posture based on such distant data could entail a substantial degradation in performance of the better part of a force in theater for as many hours as it would take for prevailing breezes to waft the clouds within reach of more informative sensors.

The short-range, ultraviolet standoff detection capability, which operates at distances of one to three kilometers, would seem to hold greater operational promise for the field commander than infrared systems. There are obvious tactical advantages to the ability to interrogate clouds for biological content at a distance that still affords some reaction time, but reduces the uncertainty about the movement of air masses. Unfortunately, the ultraviolet systems suffer from technical weaknesses that compromise their reliability. They perform poorly in detecting particles in moderately low concentrations, which might reasonably be expected of a release that had originated from some distance. They tend to have a relatively high false positive rate. One recent analysis has concluded that the optimal use of current standoff detection capabilities would be to couple nondiscriminating infrared cloud detectors to deployable point detectors.

GLOSSARY

ABL	Airborne Laser
ACADA	Automatic Chemical Agent Detector/Alarm
ACTD	Advanced Concept Technology Demonstration
ACE	Areas for Capability Enhancement
ADW	Agent Defeat Weapon
AICPS	Advanced Integrated Collective Protective System
APS	Aerosol Particle Sizer
BIDS	Biological Integrated Detection System
BM/C3I	Battle Management/Command, Control, Communications, and Intelligence
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BW	Biological Weapons
BWC	Biological and Toxin Weapons Convention
C3	Command, Control, and Communications
CB	Chemical/Biological
CBW	Chemical and Biological Warfare or Weapons
CBD	Chemical and Biological Defense
CBIRF	Chemical Biological Incident Response Force
CDC	Centers for Disease Control and Prevention
CINC	Commander in Chief
CJCS	Chairman of the Joint Chiefs of Staff
COCOM	Coordinating Committee for Multilateral Export Controls
CPC	Counterproliferation Council
CP-MS SOG	Counterproliferation Mission Support Senior Oversight Group
CPRC	Counterproliferation Program Review Committee
CTBT	Comprehensive Test Ban Treaty
CTR	Cooperative Threat Reduction
CTTS	Counterterror Technical Support
CW	Chemical Weapons or Chemical Warfare
CWC	Chemical Weapons Convention
DARPA	Defense Advanced Research Projects
DCI	Defense Capabilities Initiative
DGP	NATO Senior Defense Group on Proliferation
DIA	Defense Intelligence Agency
DMZ	Demilitarized Zone
DoD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EPCI	Enhanced Proliferation Control Initiative
FBI	Federal Bureau of Investigation
FDA	Food and Drug Administration

FEMA	Federal Emergency Management Agency
FSU	Former Soviet Union
GAO	General Accounting Office
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
HDBTDC	Hard and Deeply Buried Target Defeat Capability
IAEA	International Atomic Energy Agency
ICBM	Intercontinental Ballistic Missile (Range: greater than 5,500 kilometers)
ICAM	Improved Chemical Agent Monitor
ILEA	International Law Enforcement Academy
IPDS	Improved Point Detection System
IRBM	Intermediate Range Ballistic Missile (Range: 3,000-5,000 kilometers)
JBPDS	Joint Biological Point Detection System
JSIVA	Joint Staff Integrated Vulnerability Assessments
JSLIST	Joint Service Lightweight Integrated Suit Technology
JWCO	Joint Warfighting Capability Objective
LACM	Land Attack Cruise Missile
LNBCRS	Lightweight Nuclear Biological and Chemical Reconnaissance System
LR-BSDS	Long Range Biological Standoff Detection System
MRBM	Medium Range Ballistic Missile
MTOPS	Million Theoretical Operations Per Second
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, or Chemical
NBCRS	NBC Reconnaissance System
NDAA	National Defense Authorization Act
NIS	New Independent States
NMD	National Missile Defense
NPT	Nuclear Nonproliferation Treaty
NSG	Nuclear Suppliers Group
OSD	Office of the Secretary of Defense
P3I	Pre-Planned Product Improvement
PAC-3	PATRIOT Advanced Capability-3
QDR	Quadrennial Defense Review
R&D	Research and Development
RSCAAL	Remote Sensing Chemical Agent Alarm
SBIRS	Space ased Infrared System
SLBM	Submarine-launched Ballistic Missile
SLV	Space Launch Vehicle
SRBM	Short Range Ballistic Missile (Range: 1,000 kilometers or less)
START	Strategic Arms Reduction Treaty
TBM	Theater Ballistic Missile
THAAD	Theater High Altitude Area Defense
TMD	Theater Missile Defense

TSWG	Technical Support Working Group
UAV	Unmanned Aerial Vehicle
UN	United Nations
UNSCOM	UN Special Commission
WMD	Weapons of Mass Destruction
WMDI	Weapons of Mass Destruction Initiative