The Japan Forum on International Relations

The Japan Foundation

Nuclear, Biological, Chemical Terrorism and Steps to Prevent It

Farkhod SABIROV

Tokyo - 2008

ACKNOWLEDGEMENTS

I would like to extend my gratitude to Professor ITO Kenichi, President of the Japan Forum on International Relations (JFIR), The Global Forum of Japan (GFJ) and The Council on East Asia Community (CEAC) for his insightful guidance, support and generous advice; Mr. YANO Takuya, Research Fellow at JFIR for his insightful input and advice; Ms. WATANABE Mayu, Senior Research Fellow at JFIR for her advice and support, also other staff of JFIR for their support and assistance in preparing this research paper.

I would like to extend my gratitude to Mr. OGAWA Tadashi, Managing Director of Japanese Studies and Intellectual Exchange Department of Japan Foundation; Mr. FURUYA Masato, Director of Europe, Middle East and Africa Division, Japanese Studies and Intellectual Exchange Department of Japan Foundation; Mr. KURIHARA Tsuyoshi, Chief Officer of Europe, Middle East and Africa Division, Japanese Studies and Intellectual Exchange Department of Japan Foundation, and other staff of Japan Foundation for their support.

October 1, 2008

Farkhod SABIROV

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I. INTRODUCTION

The international community enters the 21st century as it sheds the legacy of a bi-polar world based on ideological rivalry and military confrontation. I believe that the new security architecture should have a multi-polar nature. With the end of the Cold War a conceptual consensus developed regarding the need to widen and deepen cooperation among countries that play an active role in security issues. This stems from awareness that the multi-faceted nature of security challenges has necessitated a multi-institutional response. Change has already started, and we are beginning to discern the preliminary outlines of a new security system. However the process of building a multi-polar world follows a bumpy road and encounters many obstacles along its way. One of them – international terrorism which is endangering the security of the states and their citizens; it results in serious political, economic and moral consequences, has a strong psychological influence on the people, and takes away many lives.

All modern societies are vulnerable to massive loss of life from an attack involving a weapon of mass destruction – nuclear, biological or chemical (NBC). This vulnerability has existed for many years: it is a simple function of accessible weapons, porous borders, free and open societies and high population densities in cities. There is a danger that these weapons might be used by a non-state or transnational actor in a campaign of mass-destruction terrorism.

The likelihood of a catastrophic terrorist attack against many countries is growing and security at many of country's civil nuclear facilities remains insufficient. The explosion of a nuclear bomb would clearly be the most intimidating of possible catastrophic terrorism scenarios because of the massive casualties, disruption, and psychological impact it would cause. In addition to trying to obtain a nuclear warhead, the terrorists might also attempt to hijack a nuclear-armed submarine or seize a nuclear facility to disperse large quantities of radioactive materials.

This paper is devoted to the research of the complex of theoretical and scientific applicative issues related to the NBC terrorism and steps to prevent it.

The main goal of this paper is focused on the research and analysis of major trends of the NBC terrorism, on the determination of its role and place in the new national and international security concept definition, on drafting theoretical justification of practical recommendations to optimize the national and international policy for fight against NBC terrorism.

The scientific innovation of paper is the fact that through the logical development of a number of ideas, the basic assumptions to liquidate NBC terrorism; major forms of joining efforts of the intelligence agencies to fight against NBC terrorism; the need to analyze and generalize the information on the situation and dynamics of the international terrorist manifestations; the role of parliaments and inter-parliamentary organizations to increase the effectiveness of fight against NBC terrorism; the drafting and consistent implementation on the international level of the common political stand and concerted practical actions to counteract NBC terrorism were highlighted.

The final part of paper amount to generalizations and suggestions resulting from the in-depth study, research and analysis of the NBC terrorism and steps to prevent it.

II. CHARACTERISTICS OF WEAPONS OF MASS DESTRUCTION (WMD)

A basic understanding of the nature of the weapon types is important for understanding the nature of the threat of NBC terrorism, and for fashioning an appropriate strategy against it. In general, terrorist weapons can be categorized into four major types. It is important to remember that different types of weapons can be combined or used sequentially. Terrorist weapons are often referred to as weapons of mass destruction (WMD) because of the ability to kill large numbers of people.

The difficulty of obtaining and using nuclear, biological, and chemical weapons varies widely, both between and within the weapon types. Many factors are relevant: the size, sophistication and type of the weapon being sought; the availability of the technical information needed to design the weapon; the accessibility of essential precursor materials and equipment; the difficulty of weapon design and construction; the extent to which the peculiarities of the weapon complicate the organization of a clandestine acquisition effort; and the existence of externally observable marks that increase the likelihood of discovery.

The four types of weapons are:

1. Improvised Explosive Weapons;
2. Nuclear Weapons;
3. Biological Weapons;
4. Chemical Weapons.

1. Improvised explosive weapons

The most likely type of terrorist weapon is an improvised explosive device (IED). An IED is a bomb fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy or incapacitate personnel or vehicles. In some cases, IEDs are used to distract, disrupt, or delay an opposing force, facilitating another type of attack. IEDs may incorporate military or commercially-sourced explosives, and often combine both types, or they may otherwise be made with home made explosives (HME).

Some of these improvised weapons pack a very powerful punch and can bring down large buildings. The casualties could number in the hundreds in this type of attack. Examples of this type weapon were attacks the World Trade Center - 1993, Murrah Federal Building in Oklahoma City - 1995, Ismailovskiy Park, Moscow – 1995, US Embassies in Tanzania and Kenya - 1998, Grozny stadium, Chechnya - 2002, Ingushetia, Nazran, - 2004, etc. A small explosive device might be used to disperse chemical, biological or even radioactive agents. Another purpose of a small device might be to bring large numbers of first responders, who are then subjected to a larger secondary device. In the 2003–present Iraq War, IEDs have been used extensively against coalition forces and by the end of 2007 they have been responsible for at approximately 40% of coalition deaths in Iraq. They are also used extensively by cadres of the rebel Tamil Tiger (LTTE) organization against military and civilian targets in Sri Lanka. IEDs are often placed on the curb of roads so as to be detonated when vehicles or pedestrians pass by, and so are sometimes also known as roadside bombs.

Terrorists recently utilized a new type of explosive weapon, the airplane. Quantities of residual, unburned fuel may remain when an aircraft is used as the weapon of attack. Terrorists could also attempt to replicate the impact of improvised weapon by attacking a civil nuclear power reactor. A successful attack could have an impact similar to, or greater than, the Three-Mile Island or Chernobyl accidents.

2. Nuclear weapons

Nuclear weapons release vast amounts of energy through one of two types of nuclear reaction – fission and fusion. Fusion weapons are far more destructive than fission weapons, but can be produced only by technologically advanced states, at great cost. Fission weapons are less powerful than fusion weapons, but are considerably more accessible. A first-generation fission weapon – like those used on Hiroshima and Nagasaki – would have an explosive yield of around 10,000 tons of Trinitrotoluene (TNT).[1] Depending on population density, weapon yield, and the severity of subsequent fires, a nuclear fission detonation in a city would kill over

[1] Trinitrotoluene (TNT) is a chemical compound. This yellow-colored solid is a reagent (reactant) in chemistry but is best known as a useful explosive material with convenient handling properties.

one hundred thousand people and devastate an area extending a mile or more from ground zero. A hydrogen bomb the Soviet Union tested in 1961 produced an explosive power of 58 megatons (equivalent to the combined explosive power of 4,462 atomic bombs dropped on Hiroshima). At the height of the Cold War between the United States and the Soviet Union, the former had 25,000 strategic, theater and tactical nuclear warheads, and the latter, 45,000 – and they created a situation of overkill. It was plain to anyone that, once a nuclear exchange would take place, no room would be left for either side to emerge as a winner.[2]

Nuclear weapons are presently found in the arsenals of only eight states: the United States, Russia, Great Britain, France, China, India, Pakistan, and Israel. South Africa built six fission weapons, but dismantled them before the transfer of power to the ANC-led government. Iraq sought to obtain nuclear weapons, but its program was stopped. North Korea is believed to have produced and separated a small amount of plutonium, perhaps enough for 6-8 nuclear weapons. Iran is believed to be seeking nuclear weapons, but is thought to be at least several years from developing them. Other states, including several European states, Japan, South Korea, Taiwan, Brazil, Argentina, and others, have a well-developed scientific and industrial base that would allow them to build nuclear weapons relatively easily if they chose to do so.

The only absolute technical barrier to nuclear weapons acquisition is access to a sufficient quantity of fissile material, either plutonium or highly enriched uranium (HEU). If this obstacle were removed through the theft or purchase of fissile material, almost any state with a reasonable technical and industrial infrastructure could fabricate an improvised nuclear weapon. Some exceptionally capable non-state actors could also design and build a nuclear weapon, particularly if they had access to a substantial quantity of HEU metal, which allows an inefficient but simple weapon design to be used. The collapse of the Soviet Union, which exposed large stockpiles of fissile material to an unprecedented risk of theft and diversion, has significantly heightened the risk of nuclear weapons acquisition by non-state actors and states without an indigenous fissile material production capability.

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[2] ITO Kenichi, *"The Security Questions in the Post-War Era"* - Keynote Speech Delivered at the International Forum on the History of War, September 18, 2002.

3. Biological weapons

Biological weapons disseminate pathogenic micro-organisms or biologically produced toxins to cause illness or death in human, animal or plant populations. Whereas normal diseases begin in small pockets and spread through natural processes of contagion, biological weapons using microbial agents deliberately release large quantities of infectious organisms against a target population. The result is a massive, largely simultaneous outbreak of disease after an incubation period of a few days, depending on the agent and the dose inhaled. Because of their ability to multiply inside the host, pathogenic microorganisms can be lethal in minute quantities: an invisible speck of disease-causing microbes can kill or incapacitate a grown man, and a few kilograms of effectively disseminated concentrated agent could cause tens to hundreds of thousands of casualties. Biological warfare agents without a system for aerosol dissemination cannot easily cause casualties on this scale, and should therefore be considered potentially dangerous contaminants rather than weapons of mass destruction.

Toxin weapons disseminate poisonous substances produced by living organisms, and are therefore commonly classified as biological weapons. Like biological agents, toxins generally need to be delivered as an aerosol to be effective as anything more than a contaminant or an assassination weapon. Toxins differ from microbial biological warfare agents, such as bacteria, in that they are non-living, like man-made chemical poisons. Gram for gram, toxins are less deadly than certain living pathogens, since the latter reproduce themselves in the victim. Toxins are not contagious, and thus cannot spread beyond the population directly attacked.

Aerosols of toxins and pathogenic microorganisms in low concentrations are generally odorless, tasteless and invisible. Unless the agent-dissemination device (e.g., an aerosol sprayer) is found and identified, it is entirely possible that a terrorist biological weapons attack could go undetected until the infected population begins to show symptoms of disease or poisoning. Once a surreptitious biological attack is identified, it may be too late to limit its geographic extent or control its medical consequences. In addition, dispersal devices could be gone, perpetrators could be nowhere near the location of the attack, and responsibility for the attack could be very difficult to attribute to a particular state or non-state actor. This combination of factors makes biological weapons especially suitable for terrorist delivery. Also,

depending on the type of agent used and the nature of the disease outbreak, a surreptitious biological attack on a civilian population could initially be mistaken for a natural epidemic. Detection time, therefore, may depend on the nature of the attack and the quality of the public health system.

Many states and moderately sophisticated non-state actors could construct improvised but effective biological weapons. Quite detailed information on the relevant science and technology is available from open sources. Culturing the required microorganisms, or growing and purifying toxins, is inexpensive and could be accomplished by individuals with college-level training in biology and a sound knowledge of laboratory techniques. Acquiring the seed stocks for pathogenic microorganisms also is not particularly difficult, but the easiest acquisition option – placing an order with a biological supply service – has been made somewhat more difficult by regulations enacted in 1995.[3] The most significant technical challenge in fabricating a biological weapon is effectively disseminating a bulk biological agent as a respirable aerosol. The most efficient aerosolization systems, which could produce extremely high casualties over wide areas, would require considerable technological sophistication, and remain beyond the reach of most states and most conceivable non-state actors. However, less efficient aerosolization techniques are available, and could be mastered by many states and some highly capable non-state actors. The effects of biological attacks could vary greatly, but a single biological weapon could kill or incapacitate thousands to tens of thousands of people even with an inefficient delivery system, especially if directed against large indoor targets.

4. Chemical weapons

Chemical weapons are extremely lethal man-made poisons that can be disseminated as gases, liquids or aerosols. There are four basic types of chemical weapons:

- choking agents, such as chlorine and phosgene, which damage lung tissue;
- blood gases, such as hydrogen cyanide, which block the transport or use of oxygen;

[3] Thomas V. Inglesby, et al., *"Anthrax As a Biological Weapon, 2002,"* Journal of the American Medical Association 287, no. 17 (May 1, 2002).

- vesicants, such as mustard gas, which cause burns and tissue damage to the skin, inside the lungs, and to tissues throughout the body;
- and nerve agents, such as tabun, sarin, and VX, which kill by disabling crucial enzymes in the nervous system.

Chemical warfare agents are highly toxic, but must be delivered in large doses to affect large open areas. For open-air targets, the mass of agent required – even highly toxic ones, such as sarin – rapidly reaches hundreds to thousands of kilograms per square kilometer, depending on weather conditions, and even if the agent is efficiently dispersed. A simple outdoor attack, involving no more planning and execution than a large truck-bomb attack, is thus likely to kill at most a few hundred people even at high population densities. An attack on a crowded indoor area might kill a few thousand people. Some chemical warfare agents are highly persistent, and could render large areas uninhabitable for extended periods of time, requiring costly decontamination and clean-up efforts.

Chemical weapons suitable for mass-casualty attacks can be acquired by virtually all states and by non-state actors with moderate technical skills. Certain very deadly chemical warfare agents can quite literally be manufactured in a kitchen or basement in quantities sufficient for mass-casualty attacks. Production procedures for some agents are simple, are accurately described in publicly available sources, and require only common laboratory glassware, good ventilation, and commercially available precursor chemicals. Greater expertise and some specialized equipment are required to fabricate the most toxic chemical warfare agents, but the acquisition of quantities sufficient for mass-casualty attacks would still be within the reach of some technically capable non-state actors. The Japanese cult Aum Shinrikyo produced tens of kilograms of the nerve gas sarin, demonstrating the technical feasibility of the acquisition of chemical weapons by capable non-state actors. The actual use of a highly toxic chemical agent as a weapon of mass destruction is not especially difficult in principle.

III. HOW TERRORISTS CAN GET THE WEAPONS OF MASS DESTRUCTION

The danger that NBC weapons or the materials and expertise needed to make them might fall into terrorist hands remains very real. Indeed, it is difficult to say whether, over the last years, the threat has decreased or increased – because there are both positive and dangerous trends underway. There are two basic ways terrorists could stage a nuclear attack:

1. by stealing or buying NBC weapons;
2. by building or developing NBC weapons by themselves.

1. Theft

The collapse of the Soviet Union left a superpower arsenal of 30,000 nuclear weapons, and bomb-usable nuclear materials for a additional 70,000 weapons, biological and chemical weapons, scattered across more than 100 cities. To the world's great fortune, Russian professionals apparently succeeded in extracting and returning safely every last one of these warheads. What we know for certain is that not a single former Soviet nuclear weapon has been found in another country or in an international arms bazaar. This incredible result is testimony to the determined efforts of the Russian government, including in particular the nuclear guardians in its Ministry of Defense and Ministry of Atomic Energy, supported by technical and economic assistance from the United States following from the Nunn–Lugar legislation and subsequent acts of Congress. Yet, in spite of the fact that we have no proof that a Soviet NBC weapons have reached an unintended destination, we cannot rule out this possibility. Over the years, there have been a number of reported attempts to obtain nuclear materials from the Soviet armories. In November 2001, for example, the Russian Defense Ministry reported two attempted break-ins at nuclear weapons storage sites. In August 2003 the deputy director of the organization that carries out repair work for Russian nuclear icebreakers and nuclear submarines was arrested in Murmansk for trying to steal nuclear materials.[4]

[4] The National Security Advisory Group; Wendy R. Sherman, Robert J. Einhorn, "*Reducing Nuclear Threats and Preventing Nuclear Terrorism,*" October 2007.

Among international terrorists, Chechen separatists have had a long-standing interest in acquiring NBC weapons and materials especially to use in their campaign against Russia. Chechen militants have conducted surveillance of the railway system and special trains designed for shipping NBC weapons across Russia. They also succeeded in acquiring radioactive materials from a Grozny nuclear waste plant in January 2000 and stealing radioactive metals – possibly including some plutonium – from the Volgodonskaya nuclear power station in the southern region of Rostov between July 2001 and July 2002.[5]

At the same time, after US invasion to Iraq and the continuing Israeli-Palestinian conflict, hostility toward the United States and European countries in the Islamic world has grown to "shocking" levels (as a new report commissioned by the State Department puts it)[6] providing al Qaeda and its brethren with new opportunities to recruit – which could include recruits capable of providing NBC weapons expertise or access to the materials needed to make them (a danger highlighted by the case of senior Pakistan nuclear weapon scientist Sultan Bashiruddin Mahmood, an anti-American Islamic extremist who met with bin Laden at length and discussed NBC weapons).[7]

In August 2004, British police arrested Dhiren Barot, leader of a group of eight men, which planned to carry out multiple terrorist attacks in Britain and in the United States. Among the group's plans was setting on fire ten thousand household smoke detectors to disperse the small amounts of americium which they hold.[8] In January 2005, German police arrested an Iraqi and a Palestinian who unsuccessfully attempted to acquire 46 grams of highly enriched uranium from a group in Luxemburg, allegedly on behalf of al Qaeda.[9]

Elsewhere, deadly dangers are growing. With North Korea's claim that they have processed fuel rods containing enough plutonium for 6-8 nuclear weapons, the probability that

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[5] Simon Saradzhyan, *"Russia: Grasping Reality of Nuclear Terror,"* BCSIA Discussion Paper 2003-2, KSG, Harvard, March 2003.

[6] Advisory Group on Public Diplomacy for the Arab and Muslim World, Edward P. Djerejian, *"Changing Minds, Winning Peace: A New Strategic Direction For U.S. Public Diplomacy in the Arab & Muslim World,"* Washington, DC: U.S. Department of State, October 1, 2003.

[7] Kamran Khan and Molly Moore, *"2 Nuclear Experts Briefed Bin Laden, Pakistanis Say,"* Washington Post, December 12, 2001; Peter Baker, *"Pakistani Scientist Who Met Bin Laden Failed Polygraphs, Renewing Suspicions,"* Washington Post, March 3, 2002.

[8] Adam Zagorin and Elaine Shannon, *"London's Dirty Bomb Plot,"* Time, 3 October 2004.

[9] *"Mutmabliche Terroristen in Deutschland gefasst,"* Agence France Press, 23 January 2005.

terrorists could buy plutonium from that source – or that there could be another source of "loose nukes" if North Korea collapsed – has clearly increased.[10]

Modern United States and Russian warheads are equipped with sophisticated devices to prevent unauthorized use that terrorists would find extremely difficult to bypass. The same cannot be said with certainty of devices made by India or Pakistan, home of the notorious A.Q. Khan, father of Pakistan's bomb and Godfather of an international nuclear proliferation network. Should the current government of Pakistan be overthrown, or chronic instability degenerate into chaos, control of that country's devices might weaken, and terrorist groups might be able to buy or steal NBC weapons from that country's inventory.

Thousands of laboratories around the world are engaged in biotechnology and nanotechnology research and development. Many are in the United States and Europe, but also in Argentina, Brazil, Chile, China, India, Japan, Russia, South Korea, Thailand, and more. The terrorist can capture directly these laboratories or scientists who are working there.

2. Build or develop

It is commonly thought that building a nuclear bomb is a project that would cost billions of dollars, take years of effort, and employ thousands of people. In fact, a workable Hiroshima-size bomb could be built by 20 people for less than $10 million, provided they did not have to produce the weapons-grade fissionable material. As far back at 1964, in an experiment devised at Lawrence Livermore laboratory, two recent PhD students, with no prior knowledge of nuclear explosives, using only information from a university library, a machine shop, and conventional explosives, designed a workable, Hiroshima-size bomb. Senator Joseph Biden reported in 2004 that he had asked the heads of the national laboratories to build a nuclear bomb using only off-the-shelf materials. They built one in a matter of months.

In the biological and chemical sphere, a lone individual with a modicum of laboratory training, and with access to a select agent, could produce a biological or chemical arsenal in a few weeks.

[10] Ashton B. Carter, William J. Perry, and John M. Shalikashvili, "*A Scary Thought: Loose Nukes in North Korea*," Wall Street Journal, February 6, 2003.

A U.S. State Department report in 2006 noted: "Among present-day terrorist organizations, al-Qaeda is believed to have made the greatest effort to acquire and develop biological and chemical weapons. United States forces discovered a partially built biological and chemical weapon laboratory near Kandahar after expelling the Taliban from Afghanistan." Al-Qaeda's interest in developing biological and chemical weapons was also confirmed in documents and on computers captured in Afghanistan. Whether any biological and chemical agents were actually developed as weapons is questionable. Author Ron Suskind reported that intelligence officials told him that in 2003 the CIA found "extremely virulent" anthrax in an Afghanistan laboratory. The claim has not been publicly substantiated by any other authority.[11] The 2006 call from the leader of al Qaeda in Iraq for "nuclear scientists" to join the jihad highlights the continuing threat[12] – another example that terrorist groups want to develop NBC weapons.

Besides al-Qaeda, Palestinian terrorist groups including Hamas have expressed interest in developing biological and chemical weapons and claimed success in acquiring them. In June 2006, the Aksa Martyrs Brigades, which is part of the Palestinian Authority, announced it had produced "at least 20 different types of biological and chemical weapons."[13]

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[11] Ron Suskind, "*The One Percent Doctrine: Deep Inside America's Pursuit of Its Enemies Since 9/11,*" New York: Simon and Schuster, 2006

[12] David Rising, "*Iraq Terrorist Calls Scientists to Jihad,*" Associated Press Newswires, 28 September 2006.

[13] The Jerusalem Post, June 26, 2006.

IV. VOZROZHDENIYE ISLAND – SERIOUS PROBLEM OF ARAL SEA REGION

Located in the central Aral Sea, The Vozrozhdeniye (Renaissance or Rebirth) Island was one of the main laboratories and testing sites for the Soviet Union government's Microbiological Warfare Group. The island was apparently chosen for open-air testing of biological weapons (BW) because of its geographical isolation.

Vozrozhdeniye Island is situated in the middle of the Aral Sea, surrounded by large, sparsely populated deserts and semi-deserts that hindered unauthorized access to the secret site. The island's sparse vegetation, hot, dry climate, and sandy soil that reaches temperatures of 60· C (140· F) in summer all reduced the chances that pathogenic microorganisms would survive and spread. In addition, the insular location prevented the transmission of pathogens to neighboring mainland areas by animals or insects. The northern part of Vozrozhdeniye Island, which Kazakhs call Mergensay, is on Kazakhstan territory. The southern two-thirds of the island is on Uzbekistan territory.

In 1936, Vozrozhdeniye Island was transferred to the authority of the Soviet Ministry of Defense (MOD) for use by the Red Army's Scientific Medical Institute. In 1952, the Soviet government decided to resume BW testing on islands in the Aral Sea. A biological weapons test site, officially referred to as "Aralsk-7," was built in 1954 on Vozrozhdeniye and Komsomolskiy Islands. The MOD's Field Scientific Research Laboratory (PNIL) was stationed on Vozrozhdeniye Island to conduct the experiments. Military unit 25484, comprising several hundred people, was also based on the island and reported to a larger unit based in Aralsk. The PNIL developed methods of biological defense and decontamination for Soviet troops. Samples of military hardware, equipment, and protective clothing reportedly passed field tests at the island before being mass-produced. During the Soviet intervention in Afghanistan, military protective gear developed for Afghan conditions was tested at the PNIL.

1. Infrastructure and BW Development

The BW test site on Vozrozhdeniye Island was divided into a testing complex in the southern part of the island and a military settlement in the northern part where officers, some

with families, and soldiers lived. The settlement had barracks, residential houses, an elementary school, a nursery school, a cafeteria, warehouses, and a power station. Personnel were subjected to regular immunizations and received hardship benefits. PNIL laboratory buildings, located near the residential area, possessed up-to-date equipment and a Biosafety Level 3 containment unit. Also located in the northern part of the island was Barkhan Airport, which provided regular plane and helicopter transportation to the mainland, and a seaport at Udobnaya Bay. Special fast patrol boats protected the island from intruders.

The open-air test site in the southern part of the island was used for studying the dissemination patterns of BW agent aerosols and methods to detect them, and the effective range of aerosol bomblets with biological agents of different types. The testing grounds were equipped with an array of telephone poles with detectors mounted on them, spaced at one-kilometer intervals. BW agents tested at the Vozrozhdeniye site had been developed at the MOD facilities in Kirov, Sverdlovsk, and Zagorsk, and the Biopreparat center in Stepnogorsk, and included anthrax, tularemia, brucellosis, plague, typhus, Q fever, smallpox, botulinum toxin, and Venezuelan equine encephalitis. The experiments were conducted on horses, monkeys, sheep, and donkeys, and on laboratory animals such as white mice, guinea pigs, and hamsters. In addition to common pathogenic strains, special strains developed for military purposes were tested at the island. Bacterial simulants were also used to study the dissemination of aerosol particles in the atmosphere.

The fact that the island's prevailing winds always blow toward the south, away from the northern settlement, was probably an important factor in designing the site. The BW aerosol tests were also conducted in such a way as to avoid contaminating the northern military settlement, and a special service on the island was responsible for environmental control. Nevertheless, the activities on the secret island caused serious concerns among local residents because of repeated epidemics and the mass deaths of animals and fish in the area. Individual cases of infectious disease also occurred in people who spent time on the island.

2. Desiccation of the Aral Sea

The Aral Sea is fed by two rivers - the Amu Darya and the Syr Darya, which pass through a large desert area that has been turned into irrigated farmland. Planners diverted most of the fresh river waters that once flowed to the Aral Sea to irrigate water-intensive cotton crops. Only 10 percent of that water now reaches the Aral. As a result, the Aral, once the fourth largest inland sea, has lost over half its surface area since 1960 and continues to shrink. Islands are rising from the sea and have split it into several separate water bodies.

The accompanying loss of the commercial fishing industry, deterioration in water quality, contamination of the soil from salt blown hundreds of miles from the former sea bottom, and declining ground water levels have devastated a 400,000 square kilometer region. For example, a fish processing factory which was once on the banks of the Aral Sea is now 80 km from the beach. Trainloads of fish now are transported from the Pacific Ocean to keep the factory open and the surrounding community productive. Also, as the Amu Darya and Syr Darya flow through the farmland, they collect agricultural chemicals which then are deposited into the Aral Sea. As these chemicals have moved into the sea and surrounding area, soil fertility has decreased and human health problems have increased in the area. Cancer rates and birth defects are up. Several science teams are studying the death of what was once the fourth largest lake in the world.

Comparison of 1962 CORONA imagery with more recent satellite data shows details of the dramatic change in the shoreline of the Aral Sea in Russia resulting from extraction for agricultural and other purposes.

By the early 1990s, the desiccation of the Aral Sea, which had been taking place since the 1960s because of the diversion of water into irrigation projects, had begun to impair the operation of the Vozrozhdeniye test site. Although the island was initially 200 square kilometers in size, it expanded to 2,000 square kilometers by 1990. The shrinkage of the Aral Sea increased operational expenditures at the test site, particularly the cost of importing necessary items. The site's port had to be relocated several dozen kilometers away from the settlement, increasing the need for ground transportation and the size of the labor force needed for loading and unloading operations. Kazakhstan specialists believe that by 2010, the island will be connected to the mainland; there is already a shallow zone between the island

and the settlement of Muynak on the Uzbekistan coast. The emergence of a land bridge would eliminate the major security benefits of the island.

The Moscow authorities did not allow Kazakhstan public representatives to visit Vozrozhdeniye Island until 1990. The first Kazakhstan commission, headed by N. I. Ibrayev, Deputy Chairman of the Kzylorda Oblast Executive Committee of the CPSU, visited the island in August 1990. The visit was hosted by Valeriy Sinevich, the commander of the military unit stationed on the island, and Victor Donchenko, deputy head of the PNIL. In the spring of 1992, a second Kazakhstan government commission headed by Svyatoslav Medvedev, Minister of Ecology and Bioresources, visited the island. In August 1992, an independent expert commission of the Aral-Asia-Kazakhstan non-governmental organization also visited. The Russian military authorities claimed that no offensive testing or research had been conducted on the island and that the site had tested only defenses against biological weapons.

Evacuation of Russian military personnel from Vozrozhdeniye Island began in 1991, when the PNIL specialists left and the laboratories were mothballed. On January 18, 1992, the Supreme Soviet of newly independent Kazakhstan issued the edict "On Urgent Measures for Radically improving the Living Conditions of Aral Area Residents," which officially closed the Vozrozhdeniye military site. On April 11, 1992, Russian President Boris Yeltsin's Edict No. 390, "On Ensuring the Implementation of International Obligations Regarding Biological Weapons," ordered that all offensive BW programs be shut down. Following this decree, the Russian government declared that the Vozrozhdeniye site was closed, the special structures would be dismantled, and within two to three years the island would be decontaminated and transferred to Kazakhstan control. In August 1995, specialists from the US Department of Defense visited Vozrozhdeniye Island and confirmed that the experimental field lab had been dismantled, the site's infrastructure destroyed, and the military settlement abandoned.

After the Russian authorities left Vozrozhdeniye Island in 1992, local residents of Kazakhstan and Uzbekistan flocked to the island to seize abandoned military equipment that the Russian forces had been unable to take with them. It is to be hoped that the looting occurred in the safer, residential part of the island. Kazakhstan has not yet used the portion of

the island under its jurisdiction for economic purposes, and specialists remain concerned about environmental contamination.

American scientists have found live spores of the deadly anthrax bacteria in a pit on Vozrozhdeniye Island, where the biological weapon was supposed to have been buried safely more than a decade ago, The New York Times reported on 02 June 1999. The newspaper described the Central Asia island where the pit is located as "the world's largest anthrax burial ground." Hundreds of tons of anthrax bacteria, which were developed in the Urals region of Russia under the Soviet biological weapons program, were drenched in bleach, sealed in stainless steel drums and sent to the island by train. The bleach was to have killed the bacteria before it was buried in the pit. However, US military scientists and intelligence officials, who have studied the site for four years, found that some spores survived and were potentially lethal. The danger of contamination has increased because the Aral Sea is drying up. As it does so, the island has grown, and local officials fear it will soon be connected with the mainland.

Brian Hayes, a biochemical engineer with the United States Department of Defense Threat Reduction Agency, led an expedition in the spring and summer of 2002 to neutralize what was likely the world's largest anthrax dumping grounds. His team of 113 people neutralized between 100 and 200 tons of anthrax over a three-month period. But there are still many of the containers holding the spores were not properly stored or destroyed, and over the last decade many of the containers have developed leaks. As the Aral Sea continues to recede, the area will eventually connect further with the surrounding land. Many scientists fear that animals will move to the surrounding land and eventually carry these deadly biological agents out. Another danger is terrorists groups. Therefore Uzbekistan and Kazakhstan have sought US and Russian assistance in identifying and destroying biological agents in Vozrozhdeniye Island.

V. POSSIBLE CONSEQUENCES OF A TERRORIST NUCLEAR, BIOLOGICAL AND CHEMICAL (NBC) ATTACK

The defining element of a terrorist NBC attack is that the weapon is delivered against its target in a manner that cannot be readily distinguished from the normal background of traffic and activity. A wide variety of terrorist NBC delivery methods are available, ranging from the simple to the sophisticated. This attack technique can be used by anyone with access to an appropriate weapon, be it a state with advanced delivery systems at its disposal or a terrorist group with no other delivery option. Any potential aggressors competent enough to acquire a weapon of mass destruction in the first place would be able to deliver the weapon covertly against high-value targets in open societies with a very high chance of success.

In a real terrorist NBC attack, the target may not initially know if the perpetrator is a state or non-state actor, and the issue will not make much difference to the immediate operational response to the incident. A terrorist NBC attack could target civilians, military forces, or infrastructure; could occur in peacetime or during war; and could be a single event or part of a larger campaign. The physical and social consequences of even one attack of this kind against a population center could be catastrophic. Everyone can imagine a gruesome hypothetical attack, with casualties mounting from the thousands to hundreds of thousands. The effects of a successful terrorist attack using a nuclear, biological, or chemical weapon would vary widely depending on the weapon, the target and the effectiveness of the means of delivery. The consequences of a major NBC attack would come in waves, played out over a period of months or years. The first impact would be immediate physical damage, but terrorist NBC attacks would also have broad repercussions for the economy, for the nation's strategic position in world affairs, and perhaps even for its ability to sustain itself as a strong and democratic polity. These effects could be compounded by an organized campaign of multiple attacks, or of a range of different weapon types – including conventional weapons – used in conjunction. At least seven general types of consequences are likely.

1. Massive casualties

The first and most obvious effect of a NBC attack would be its destruction of human life. The Tokyo subway attack killed twelve and injured about 5,000, but this is low on the scale of NBC weapons effects. If Aum Shinrikyo had been more efficient in its delivery of the nerve gas, fatalities would have climbed into the thousands.[14] A well-executed chemical weapon attack against a crowded civilian target could kill several thousand people. The effects of biological weapons are even more variable, but fatalities in the low tens of thousands are feasible even with unsophisticated weapons. While a more advanced biological weapon in principle could kill or injure hundreds of thousands of people, a single nuclear weapon could easily kill over a hundred thousand people if detonated in a densely populated urban area. Only wars and plagues have produced casualties on such a scale in the past – never a single attack from within.

2. Contamination

Second, a NBC attack could contaminate a large area. Depending on the type of weapon used, the area immediately affected by the attack could be rendered uninhabitable for extended periods of time, requiring a costly and perhaps dangerous clean-up operation. A nuclear weapon would also spew radioactive waste into the atmosphere, killing and sickening people downwind. NBC contamination could raise disease rates and reduce the quality of life for a much larger population than that which suffered the immediate effects of the weapon.

3. Panic

Third, a NBC attack against a civilian population would, in all likelihood, trigger a panic incommensurate with the real effects of the weapons. After the World Trade Center bombing, many more people reported to hospitals claiming ill effects than were actually injured in the incident. In a chemical or biological attack, hospitals are likely to be overwhelmed by people fearing contamination or infection. A nuclear attack – or even a limited radiological incident –

[14] Watanabe Manabu, *"Religion and Violence in Japan Today: A Chronological and Doctrinal Analysis of Aum Shinrikyo,"* Terrorism and Political Violence 10, no. 4, 1998.

is likely to stimulate uncontrolled movement away from the affected area, given the public's deep-seated fear of all things radioactive.

4. Degraded response capabilities

Fourth, the government personnel needed to conduct an effective operational response to a real NBC threat may themselves panic, flee, or refuse to carry out their responsibilities as required, compounding the effects of any attack. Active-duty military personnel will generally have the training and discipline needed to conduct operations in an extremely hazardous environment. But without appropriate equipment and training, emergency response personnel such as police, firefighters, and paramedics may well end up among the first casualties of a NBC incident. Those who arrive at the scene later might decide that the risks to themselves are too high. Congested roads and airspace are also likely to complicate whatever operational response the government is able to mount.

5. Economic damage

Fifth, a NBC attack could cause major economic damage to the affected area. A large attack or a series of attacks could damage the national economy, perhaps even precipitating a recession. Likely effects include death of and injury to workers, the destruction of physical plants, and the contamination of workplaces. An attack could also trigger a run on international financial and equity markets, especially if the target has unusual economic significance. The loss of plants and productivity from even a single, moderately damaging NBC attack could easily climb to the tens or hundreds of millions or billions of dollars.

6. Loss of strategic position

Sixth, a NBC attack or campaign of attacks could do great damage to the strategic position of the countries. The countries could be deterred from entering a regional crisis in which their national interests are threatened. Key institutions and political leaders might be attacked directly, or forces and force-projection capabilities might be damaged, in an effort to prevent an effective response.

7. Social-psychological damage and political change

Seventh, actual mass-casualty attacks, and the prospect of their continuance, could have a profound psychological effect on the target population, and an equally profound effect on the nation's politics and law. Public terror in the aftermath of a domestic NBC incident would likely be at least as intense as the abstract Cold War fear of nuclear war. Powerful, conflicting forces, including xenophobia, isolationism and revenge, would struggle for control of foreign policy. Domestically, the inability to prevent terrorist NBC attacks, or to respond to them effectively, could cause the population to lose confidence in its government, and initiate a chain of political and legal reactions leading to a fundamental shift in the relationship between citizen and state. A society that comes to fear massively destructive terrorist attacks is likely to demand action from its government. In the case of a terrorist NBC threat, that action is quite likely to involve a curtailment of civil liberties that lie at the core of the governmental systems of advanced democracies.

VI. THE LIKELIHOOD OF NBC TERRORISM

The capacity to conduct terrorist NBC attacks is growing among states and non-state actors alike. It also appears that the motivation to conduct attacks of this kind is increasing as well. For these reasons, the likelihood of terrorist NBC attacks already should be regarded as appreciable and rising.

The ability to acquire and use NBC weapons is quite distinct from the interest in causing mass casualties, which in turn is distinct from wanting to use weapons of mass destruction. A specific threat of NBC terrorism arises when a group emerges that falls into three categories simultaneously: it is capable of NBC weapons acquisition and use; interested in causing mass casualties; and interested in using NBC weapons to this end. The threat of NBC terrorism is growing more serious with time because of a widening convergence of non-state actors that are simultaneously NBC-capable and interested in causing mass casualties. At a minimum, these two trends suggest that conventional non-state violence is likely to become more deadly; at the other extreme, however, these two trends suggest that violent non-state actors are moving into position for more frequent and more effective foray into the largely uncharted territory of NBC terrorism. It is possible that none of these capable, bloodthirsty groups will choose to resort to NBC weapons, but considering the consequences which would result from such a decision, it would be imprudent in the extreme to continue to assume that the threat of NBC terrorism will lie dormant indefinitely.

1. NBC terrorism is historically rare, and likely to remain so

A review of the history of non-state actor involvement with weapons of mass destruction yields several empirical conclusions. First, with the important exception of the Aum Shinrikyo nerve gas attacks, no non-state actor has ever conducted, or attempted to conduct, an attack with a functional nuclear, biological, or chemical weapon – that is, by a device that can produce a nuclear yield or disseminate significant quantities of a biological or chemical agent over a wide area in effective form. There is little evidence that any established terrorist organization is or has been interested in acquiring, much less using, weapons of mass

destruction. There are virtually no reports, much less solid evidence, linking established terrorist groups – the Irish Republican Army, the Basque ETA, the Fatah faction of the PLO, Hizballah, Jewish extremists, the Italian Red Brigade, the many different Latin American terrorist and revolutionary groups, the Japanese United Red Army, or the various Turkish and Armenian terrorist organizations – to any serious interest in weapons of mass destruction. A possible exception is West Germany's Red Army Faction (RAF), which may have tried to produce botulinum toxin in Paris in the early 1980s, but it is not at all certain that the RAF had a clear delivery concept in mind for the toxin, much less the determination to use it.

Dozens of cases have been documented in which a non-state actor is known to have used, or attempted to use, lethal chemicals or harmful biological agents in indiscriminate poisonings, as have countless more individual assassinations and assassination attempts involving poisons. These incidents should not, however, be confused with an attack involving a biological or chemical weapon of mass destruction, which requires effective means for wide-area airborne dissemination and generally far more lethal agents. Murdering a few people with poison is a relatively simple matter, but there are logistical limits to the number of people who can be killed through product tampering. Perhaps the best known such incident occurred in September 1984, when two members of an Oregon cult led by the Bhagwan Shree Rajneesh cultivated the Salmonella bacteria and used them to contaminate salad bars in restaurants to influence a local election; an estimated 750 people became ill. Biological and chemical agents should not be considered weapons of mass destruction unless they are mated with an effective technical system for large-scale dissemination, such as an aerosol sprayer. Poisoning, product tampering, and assassination – whether by chemical or biological means – is a separate and altogether less worrisome phenomenon than the threat of terrorist attack involving biological or chemical weapons of mass destruction, or nuclear weapons, because the number of possible casualties is far more limited, product contamination is not a first-order national security threat.

Similarly, many cases have been reported – including several in the mid-1990s – in which ostensibly hostile non-state actors have been caught in possession of lethal chemicals, dangerous biological agents, or radioactive material. In April 1993, for example, Canadian border police confiscated 130 grams of ricin from Thomas Lewis Lavy, an Arkansas resident

with reported links to survivalist groups, as he tried to enter Canada from Alaska. After a two-year investigation by the FBI, Lavy was arrested and charged under the 1989 Biological Weapons Anti-Terrorism Act with possession of a biological toxin with intent to kill. He was never tried, because he hanged himself in his cell shortly after arraignment. In August 1994, Douglas Allen Baker and Leroy Charles Wheeler – both associated with the Minnesota Patriots Council, a right-wing militia group – were arrested for possession of ricin and planning to murder law enforcement personnel; their intended delivery technique was to smear the toxin on the doorknobs of their intended victims. In 1995, Larry Wayne Harris, an individual with some scientific training and right-wing affiliations, was arrested for mail fraud after ordering three vials of freeze-dried bubonic plague bacteria from American Type Culture Collection. These are not the only cases in which non-state actors have acquired some quantities of biological warfare agents, but they are the most recent. Although these cases indicate a worrying fascination with chemical and biological agents among some disaffected Americans, all of these cases lacked the evidence of serious intent or technical capacity to use the agent as an effective weapon of mass destruction.

Likewise, countless threats and extortion attempts have been made involving attacks using nuclear, biological, or chemical weapons by non-state actors, but virtually all of these have been hoaxes – often perpetrated by mentally unstable individuals – and most have been easy to dismiss as not credible.

In short, NBC terrorism is an exceptionally rare, almost unheard of, phenomenon. Put differently, except for Aum Shinrikyo, no non-state actor has yet emerged with both the technical ability and the will to acquire and use nuclear, biological or chemical weapons. Clearly, there are non-state actors – including many of unambiguous hostility, such as terrorist organizations – that possess the technical ability to acquire and use nuclear, biological, or chemical weapons, but the historical evidence suggests that virtually none of these groups have entertained a serious interest in carrying out NBC attacks. Conversely, with the exception of Aum Shinrikyo, non-state actors that have wanted to commit acts of NBC terrorism have not, so far, been able to bring them off.

2. Latent NBC potential of non-state actors is rising

The latent ability of non-state actors to master the challenges associated with NBC attacks is rising in all modern societies. This gradual increase in NBC potential is a byproduct of economic, educational and technological progress. This trend also results from the fact that in most modern societies the ability of the state to monitor and counter illegal or threatening activities is being outpaced by the increasing efficiency, complexity, technological sophistication and geographic span of legal or illegal activities of non-state actors.

The technological and scientific challenges associated with covert NBC acquisition and use are significant but they are also not getting any harder. The amount of HEU needed to produce a nuclear explosion is the same today as it was in 1945; the particle size necessary to create a stable, respirable aerosol of anthrax spores is the same today as it has always been; and the chemical structure of sarin has been the same since 1939, when the substance was discovered by a German chemist trying to produce a better pesticide. Meanwhile, non-state actors are growing steadily more capable, and thus better able to surmount the technical hurdles to NBC acquisition and use – along with many other prosaic tasks, of course. As a result, the number and range of non-state actors with NBC potential is expanding. Since the fundamental cause is social progress, this expansion of latent non-state actor NBC potential is inexorable and is not reversible by governments.

How and why is the underlying capacity of non-state actors to master the technical challenges of NBC acquisition and use increasing? The first reason is that the basic science behind these weapons is being learned by more people, better than ever before. In the United States alone, the number of people receiving bachelor's, master's, and doctoral degrees in the science and engineering fields each year more than doubled between 1966 and 2008. Education data on other countries suggest similar trends. An even more important gauge of the ability of non-state actors to build and use weapons of mass destruction, however, is the increasing level of knowledge available in even high school science courses, not to mention in undergraduate- or graduate level courses, as well as the sophistication of laboratory and analytical tools, from computers to laboratory-scale fermentation equipment, that are now routinely available. The

new physics that the Manhattan Project scientists had to discover to make nuclear weapons possible is now standard textbook fare for young physicists and engineers.

Nowhere is this phenomenon more pronounced than in biology. The advance of biological sciences is creating a situation in which a sophisticated offensive program can produce more easily advanced biological weapons with heightened resistance to prophylaxis or treatment, increased virulence, controllable incubation periods and agent longevity, and conceivably even a selectivity that targets groups of people according to their genetic makeup. The biotechnology revolution is also increasing the number of people who know how to use such agents and make them easier to produce and use. The biotechnology industry's growth is causing a steady increase in the number of people who understand how simple biological processes (such as growing bacteria) can be used in a practical way, and who are capable of manipulating these processes for their own ends. As the biotechnology sector becomes entrenched in the global economy, the number of people with the skills necessary to undertake a basic biological weapons program will inevitably grow. Just as important, the industry's growth has made available a wide range of tools and supplies – such as efficient fermenters for producing large amounts of bacteria in small facilities, and increasingly sophisticated tools for measuring aerosols – that would facilitate a basic biological weapons procurement effort.

Finally, even apart from rising education levels and growing familiarity with relevant technologies, the latent NBC potential of non-state actors is growing because the ability to acquire information of all kinds, quickly and with ease, is increasing. The Internet contains a vast amount of information relevant to the planning and execution of complex violent acts, ranging from information on specific targets to detailed accounts of previous terrorist incidents and tactics, and sometimes even basic technical information for nuclear, biological, and chemical weapons. Much of this information has been present in libraries for years, but access to it has never been easier. Today's violent non-state actors are able to start substantially higher on the terrorist learning curve, compared to their predecessors of even a decade ago, if they can conduct even a modest computerized search for information.

Most countries could seek to suppress non-state efforts to acquire weapons of mass destruction on their territory. The difficulty of clandestine NBC acquisition, therefore, depends

in part on the interested non-state actor's effectiveness at eluding the surveillance and enforcement efforts of state agencies. The relationship between any particular non-state actor and its pursuers is likely to be idiosyncratic, but as a general matter it appears that the efficiency of non-state operations is outpacing the efficiency of state operations, at least in the United States, and probably everywhere in the developed world.

A complex, illegal activity like clandestine NBC weapons acquisition has several different constituent parts, any of which may be vulnerable to law enforcement surveillance. A team of like-minded, appropriately skilled individuals must be assembled; places must be found for them to work; they must be able to communicate with one another, possibly over great distances; information, materials and equipment must be gathered, possibly from abroad; and a dangerous weapon must be assembled and delivered without mishap. This is a challenging set of tasks, and would entail risks of detection in any state able to provide for its internal security. The rapid development of increasingly pervasive communications and transportation systems makes several of these tasks easier, while the explosion of the legitimate use of such systems makes criminal usage harder to spot.

Fundamentally, this phenomenon results from advances in the private sector's ability to communicate. Whereas non-state actors once had access to little more than analog phone lines and the mail, today they can communicate by fax, cellular or satellite telephone, teleconference, alpha-numeric pagers, e-mail, computer modem, and computer bulletin boards. They can quickly transport at least certain kinds of weapons and supplies via Federal Express, DHL, and numerous other highly efficient shipping services. Telecommunications traffic has increased dramatically in both volume and variety over the last decades, easily outpacing the state's ability to keep track of it all. The communications systems available to non-state actors also now have the potential to be more secure than ever. Strong encryption systems were once "the exclusive domain of governments," but today virtually unbreakable encryption software is now readily available on the global software market, and easily downloaded off the Internet. The benefits to legitimate users are considerable, but the implications of this trend for the ability of law enforcement to cope with increasingly sophisticated non-state actors are profound.

The United States government's efforts to control the availability of unbreakable encryption software have failed, and the nature of the technology makes them unlikely to succeed in the future.

Before the information age, this situation was markedly different: state agencies had clear technological dominance over their non-state challengers, in areas ranging from sophisticated eavesdropping equipment to advanced surveillance cameras. Law enforcement and intelligence gathering continue to benefit from improving technology, but generally cannot increase their effectiveness at detecting hidden illegal activities at the same rate because of the constraints of law, manpower, financial resources and technology. As one study has put it,

> "…power is migrating to actors who are skilled at developing networks, and at operating in a world of networks…. Non-state adversaries – from warriors to criminals, especially those that are transnational – are currently ahead of government actors at using, and being able to use, this mode of organization and related doctrines and strategies."[15]

In this competition between a centralized process, in which the state seeks the needle of criminal activity in the haystack of an increasingly complex society, and decentralized criminal processes where effectiveness is limited only by human competence, resources, and ever-advancing technology, the state is clearly at a disadvantage.

3. Propensity toward mass-casualty violence appears to be rising

There is a growing body of evidence that non-state actors are becoming more interested in causing human casualties on a massive scale. This is a relatively new development, and it remains poorly understood. The classic conceptual model of a terrorist organization – that of an established group with limited political aims, a strategy of controlled violence for achieving them, and an interest in self-preservation appears to be breaking down. New groups are

[15] Arquilla, John and David Ronfeldt, "*The Advent of Netwar*," Santa Monica: RAND, 1996.

emerging with hazier objectives, shorter life spans, and a more direct interest in violence for its own sake, often for reasons rooted in religious fundamentalism or political radicalism.

Based on the most detailed database of terrorism incidents in the public domain – the RAND-St. Andrews Chronology of International Terrorist Incidents – Bruce Hoffman similarly concluded that "while terrorists were becoming less active, they were also becoming more lethal."[16]

In other words, it appears that the number of groups interested in killing large numbers of people is growing, and that the level of killing that violent non-state actors believe necessary to achieve their objectives is rising.

Three trends, often tightly interrelated, suggest that the past disincentives to mass-casualty attacks will have diminishing force in the future. First, violence and terrorism motivated by religion is becoming more common and more lethal. Second, right-wing terrorism appears to be growing both more prevalent and more lethal. Third, it now appears that more and more non-state violence is committed by ad hoc collections of like-minded individuals who come together for specific purposes, sometimes to commit a single attack.

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[16] Bruce Hoffman, "*Terrorism and WMD: Some Preliminary Hypotheses,*" Non-proliferation Review 4, no. 3, 1997.

VII. CURRENT STEPS TO REDUCE THE THREAT OF NBC TERRORISM

Several initiatives to minimize the chances of NBC proliferation have been undertaken in recent years. The majors of them:

1. Cooperative Threat Reduction Program

In an attempt to deal with the "loose nukes" left over from the Soviet arsenal, the United States and Russia, subsequently joined by other countries, signed a Cooperative Threat Reduction Agreement, commonly known as Nunn-Lugar, under which the United States would help the Russians retrieve and secure these weapons. The Cooperative Threat Reduction (CTR) Program is an initiative housed within the Defense Threat Reduction Agency (DTRA). The purpose of the CTR Program is to secure and dismantle weapons of mass destruction and their associated infrastructure in former Soviet Union states.

CTR has four key objectives:

- Dismantle FSU WMD and associated infrastructure
- Consolidate and secure FSU WMD and related technology and materials
- Increase transparency and encourage higher standards of conduct
- Support defense and military cooperation with the objective of preventing proliferation

These objectives are pursued and achieved through programs:

- Biological Threat Reduction Program (BTRP)
- Chemical Weapons Elimination Program
- Nuclear Weapons Storage Security Program (NWSS)
- Strategic Offensive Arms Elimination Program (SOAE)
- Weapons of Mass Destruction-Proliferation Prevention Initiative (WMD-PPI)

In the 17 years since the passage of Nunn-Lugar, almost 7,000 of these weapons have been deactivated and destroyed, as well as hundreds of missiles and delivery systems. For example, weapons deactivated and destroyed under this program include:

- 6,312 nuclear warheads

- 537 ICBMs
- 459 ICBM silos
- 11 ICBM mobile missile launchers
- 128 bombers
- 708 nuclear air-to-surface missiles
- 408 submarine missile launchers
- 496 submarine launched missiles
- 27 nuclear submarines
- 194 nuclear test tunnels

Other milestone results include:

- 260 tons of fissile material received security upgrades
- 60 nuclear warhead storage sites received security upgrades
- 208 metric tons of Highly Enriched Uranium were blended down to Low Enriched Uranium
- 35 percent of Russian chemical weapons received security upgrades
- 49 former biological weapons facilities were converted to joint United States – Russian research
- 4 biological weapons sites received security improvements
- 58,000 former weapons scientists employed in peaceful work through International Science and Technology Centers (of which the United States is the leading sponsor)
- 750 projects involving 14,000 former weapons scientists and created some 580 new peaceful high-tech jobs; The International Proliferation Prevention Program has funded
- Ukraine, Belarus, and Kazakhstan are nuclear weapons free

The impact of CTR, particularly as an aide to the Global War on Terrorism, is undeniable. By securing critical sources and technologies, in conjunction with increasing border security, CTR works to decrease the likelihood of NBC terrorism by denying actors many of the tools needed for wide scale devastation.

2. The Nuclear Non-Proliferation Treaty (NPT)

The Nuclear Non-Proliferation Treaty (NPT) is the cornerstone of international efforts to halt – and ultimately reverse - the spread of nuclear weapons. There are currently 189 countries party to the treaty, five of which have nuclear weapons: the United States, the United Kingdom, France, Russia, and the People's Republic of China (the permanent members of the UN Security Council).

Only four recognized sovereign states are not parties to the treaty: India, Israel, Pakistan and North Korea. India and Pakistan both possess and have openly tested nuclear bombs. Israel has had a policy of opacity regarding its own nuclear weapons program. North Korea acceded to the treaty, violated it, and later withdrew.

The NPT consists of a preamble and eleven articles. Although the concept of "pillars" appears nowhere in the NPT, the treaty is nevertheless sometimes interpreted as having three pillars: non-proliferation, disarmament, and the right to peacefully use nuclear technology.

The spread of nuclear weapons will dramatically increase the risk of one or more of these weapons finding their way into the hands of terrorist and nuclear weapons, technology and explosive material will become harder to track.

Yet the current NPT regime is being undermined by United States policies that weaken its ability to bring other states into compliance. United States plans to produce a new generation of nuclear warheads, and the new nuclear agreement with India, coupled with United States reluctance to enter into new, binding multilateral security arrangements such as the Comprehensive Test Ban Treaty, all make more difficult the task of limiting the spread of nuclear materials and thus increase the possibility that terrorist groups will acquire nuclear weapons, material, and know-how. While United States initiatives such as the Proliferation Security Initiative (PSI) offer the potential to intercept individual shipments of nuclear materials destined for rogue states or non-state actors, the ad hoc nature of the program, its lack of a formal international legal basis, and the lack of transparency surrounding its operations, all limit the willingness of states to cooperate with it.

3. G8 Global Partnership (GP)

Six years ago at Kananaskis G8 leaders announced a bold and novel enterprise - the Global Partnership against the Proliferation of Weapons and Materials of Mass Destruction. Since then the GP has made a significant and practical impact by undertaking complex and technologically challenging projects, initially in Russia. Partners also recognize that their cooperation and future security are directly linked. The GP must evolve to meet new, emerging threats worldwide if we are to prevent terrorists, other non-state actors from acquiring chemical, biological, radiological, nuclear and/or missile capabilities.

The GP is a unique and successful G8 joint effort and has already made important achievements in the first half of its life. Most programs and projects are well on track. Progress and project implementation should speed up in the second half. This will be facilitated by multilateral and bilateral agreements and a network of contacts facilitated by the GP, so that the commitments made in Kananaskis can be fulfilled. With the Global Partnership Working Group (GPWG) an effective mechanism was created without a standing bureaucracy for unprecedented international cooperation in important and sensitive security-related areas. The GP has fostered trust and mutual understanding amongst partners and contributed to a cooperative atmosphere in sensitive areas at local levels as well. As a result the GP has been able to implement large-scale projects that make a positive difference on the ground. The GP has become an international model for addressing the most urgent issues of international security and stability, including the evolving threat posed by the spread of weapons and materials of mass destruction.

The inclusive GP principles have allowed fourteen other donors outside the G8 to participate in the GP mechanism and make their own contribution to this work.

In accordance with tasks identified in Kananaskis significant progress has been made in the following areas:

- Construction of facilities for the destruction of chemical weapons stocks, and the commencement of actual destruction;
- Dismantling decommissioned nuclear submarines and securing and removing the material from them; remediation of former naval bases in order to secure and remove spent nuclear fuels and radioactive waste;

- Improving the safety and security of fissile nuclear materials and chemical weapon stocks;
- Working with former weapons scientists and technicians to provide sustainable employment for them.

With these achievements, the GP has already become an important force to enhance international security and safety. Its work has made the world safer. It has helped overcome the legacy of the Cold War by bringing people and nations together to seek the mutual benefits of enhanced global security through cooperation, and it has created a common understanding of the global importance of the tasks agreed upon in Kananaskis.

4. Biological Weapons Convention (BWC)

The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (usually referred to as the Biological Weapons Convention, abbreviation: BWC, or Biological and Toxin Weapons Convention, abbreviation: BTWC) was the first multilateral disarmament treaty banning the production of an entire category of weapons . It was the result of prolonged efforts by the international community to establish a new instrument that would supplement the 1925 Geneva Protocol.

The BWC was opened for signature on April 10, 1972 and entered into force March 26, 1975 when twenty-two governments had deposited their instruments of ratification. It currently commits the 162 states that are party to it to prohibit the development, production, and stockpiling of biological and toxin weapons. However, the absence of any formal verification regime to monitor compliance has limited the effectiveness of the Convention. (Note: As of July 2008, an additional 13 states have signed the BWC but have yet to ratify it)

The scope of the BWC's prohibition is defined in Article 1 (the so-called general purpose criterion). This includes all microbial and other biological agents or toxins and their means of delivery (with exceptions for medical and defensive purposes in small quantities). Subsequent Review Conferences have reaffirmed that the general purpose criterion encompasses all future scientific and technological developments relevant to the Convention. It is not the objects

themselves (biological agents or toxins), but rather certain purposes for which they may be employed which are prohibited. Permitted purposes under the BWC are defined as prophylactic, protective and other peaceful purposes. The objects may not be retained in quantities that have no justification or which are inconsistent with the permitted purposes.

5. Chemical Weapons Convention (CWC)

In 1992, after a decade of long and painstaking negotiations, the Conference on Disarmament agreed to the text of the Chemical Weapons Convention (CWC), which was then adopted by the General Assembly at its forty-seventh session, on 30 November 1992, in its resolution entitled Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction.

The Convention is the first disarmament agreement negotiated within a multilateral framework that provides for the elimination of an entire category of weapons of mass destruction. Its scope, the obligations assumed by States Parties and the system of verification envisaged for its implementation are unprecedented.

The Convention prohibits all development, production, acquisition, stockpiling, transfer, and use of chemical weapons. It requires each State Party to destroy chemical weapons and chemical weapons production facilities it possesses, as well as any chemical weapons it may have abandoned on the territory of another State Party. The verification provisions of the CWC not only affect the military sector but also the civilian chemical industry, world-wide, through certain restrictions and obligations regarding the production, processing and consumption of chemicals that are considered relevant to the objectives of the Convention. They will be verified through a combination of reporting requirements, routine on-site inspections of declared sites and short-notice challenge inspections. The Convention also contains provisions on assistance in case a State Party is attacked or threatened with attack by chemical weapons and on promoting the trade in chemicals and related equipment among States Parties.

The Secretary-General of the United Nations is the Depositary of the Convention. The Convention was opened for signature on 13 January 1993 in Paris by the Secretary-General of the United Nations with 130 States signing the Convention. On 31 October 1996, Hungary

became the 65th State to deposit its instrument of ratification, thus triggering the process of entry into force of the CWC 180 days later. The Convention entered into force on 29 April 1997.

The Organization for the Prohibition of Chemical Weapons (OPCW) was established in The Hague and is responsible for the implementation of the Convention. The OPCW is mandated to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among States Parties.

6. The International Atomic Energy Agency (IAEA)

The IAEA is the world's center of cooperation in the nuclear field. It was set up as the world's "Atoms for Peace" organization in 1957 within the United Nations family. The Agency:

- is an independent intergovernmental, science and technology-based organization, in the United Nations family, that serves as the global focal point for nuclear cooperation;
- assists its Member States, in the context of social and economic goals, in planning for and using nuclear science and technology for various peaceful purposes, including the generation of electricity, and facilitates the transfer of such technology and knowledge in a sustainable manner to developing Member States;
- develops nuclear safety standards and, based on these standards, promotes the achievement and maintenance of high levels of safety in applications of nuclear energy, as well as the protection of human health and the environment against ionizing radiation;
- verifies through its inspection system that States comply with their commitments, under the Non-Proliferation Treaty and other non-proliferation agreements, to use nuclear material and facilities only for peaceful purposes.

The IAEA's mission is guided by the interests and needs of Member States, strategic plans and the vision embodied in the IAEA Statute. Three main pillars - or areas of work -

underpin the IAEA's mission: Safety and Security; Science and Technology; and Safeguards and Verification.

The IAEA helps countries to upgrade nuclear safety and to prepare for and respond to emergencies. Work is keyed to international conventions, standards and, guidance. The main aim is to protect people and the environment from harmful radiation exposure. The IAEA Department of Nuclear Safety and Security is the organizational hub for this pillar of the IAEA's work.

Two sets of activities target priorities:

- In the safety area, they cover nuclear installations, radioactive sources, radioactive materials in transport, and radioactive waste. A core element is setting and promoting the application of international safety standards for the management and regulation of activities involving nuclear and radioactive materials.
- In the security area, they cover nuclear and radioactive materials, as well as nuclear installations. The focus is on helping States prevent, detect, and respond to terrorist or other malicious acts - such as illegal possession, use, transfer, and trafficking - and to protect nuclear installations and transport against sabotage.

The IAEA's work has set the framework for cooperative efforts to build and strengthen an international safety and security regime. This framework includes advisory international standards, codes, and guides; binding international conventions; international peer reviews to evaluate national operations, capabilities, and infrastructures; and an international system of emergency preparedness and response.

7. The Comprehensive Nuclear-Test-Ban Treaty

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear explosions on Earth whether for military or for peaceful purposes.

The Treaty was opened for signature in New York on 24 September 1996, when it was signed by 71 States, including five of the eight then nuclear-capable states. The CTBT has now been signed by 178 states and ratified by 144. On 16 January 2007, Moldova ratified the CTBT, completing the ratification of the treaty by all the states of Europe. India and Pakistan, though

not nuclear weapons states as defined by the Nuclear Nonproliferation Treaty (NPT), did not sign; neither did the Democratic People's Republic of Korea (North Korea). India and Pakistan conducted back-to-back nuclear tests in 1998, while North Korea withdrew from the NPT in 2003 and tested a nuclear device in 2006. Fifteen other states have not signed. The treaty will enter into force 180 days after the 44 states listed in Annex 2 of the treaty have ratified it. Nine of these have not yet done so, including two nuclear weapon states under the NPT (the United States and the People's Republic of China) as well as all four states outside the NPT (India, Pakistan, Israel and North Korea).

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization was established on 19 November 1996 by a Resolution adopted by the Meeting of States Signatories at the United Nations in New York. Article II of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) provides for the establishment of a Comprehensive Nuclear-Test-Ban Treaty Organization to achieve the aims of the Treaty, ensure its implementation and to serve as a forum for its members. Since the activities will be very extensive and must be fully operational when the Treaty enters into force, the States signing the Treaty decided that it was necessary to establish an interim organisation - a Preparatory Commission. This Commission would lay the groundwork required and build up the global verification regime to monitor compliance with the Treaty.

According to the Annex establishing the Commission, its main purpose is to carry out the necessary preparations for the effective implementation of the CTBT and to prepare for the first session of the Conference of States Parties to the Treaty which will take place when the Treaty has entered into force.

The Commission's duties focus on the promotion of the signing and ratification of the Treaty so that it can enter into force as soon as possible.

Another duty of the Commission is to establish a global verification regime to monitor compliance with the comprehensive ban on nuclear testing, which must be operational when the Treaty enters into force. This prodigious task involves the build up of 321 monitoring stations and 16 radionuclide laboratories throughout the world. It also includes the provisional

operation of an International Data Centre (IDC) and the preparation of on-site inspections in case of a suspected nuclear test.

8. International Convention for the Suppression of Acts of Nuclear Terrorism

The General Assembly, by its resolution 59/290 adopted without a vote the Convention on 13 April 2005. The main objective of the Convention is to prevent and suppress acts of nuclear terrorism.

Article 1 of the Convention provides for the definitions of, inter alia, "radioactive material", "nuclear material", "nuclear facility", "device", "State or government facility" and "military forces of a State". In accordance with article 2, the Convention applies to acts committed by individuals.

Within the meaning of the Convention, any person commits an offence if that person possesses radioactive material or makes or possesses a device with the intent to cause death or serious bodily injury or to cause substantial damage to property or to the environment. The use or threat of use of radioactive material or a device constitutes an offence under the Convention. Any person also commits a crime if that person attempts to commit an offence or participates as an accomplice in the commission of the above acts.

The Convention does not apply where the offence is committed within a single State, the alleged offender and the victims are nationals of that State, and no other State has a basis to exercise jurisdiction. The Convention does not apply to the activities of armed forces during an armed conflict, which are governed by international humanitarian law. Nor does it apply to the activities of military forces in the exercise of their official duties in as much as they are governed by other rules of international law. The Convention does not address the issue of the legality of the use or threat of use of nuclear weapons by States.

Parties are required to establish the acts referred to in article 2 as criminal offences under their national laws, and to make such offences punishable by appropriate penalties. The Convention places an obligation on the Parties to cooperate in preventing acts of nuclear terrorism by, inter alia, exchanging accurate and verified information to detect, suppress and investigate the above offences. Each Party is required to establish its jurisdiction over the

offences committed in its territory or onboard a vessel or aircraft registered in that State, or when the alleged offender is a national of that State. The Convention requires the Parties either to prosecute or extradite the alleged offender. It provides for the widest measure of mutual legal assistance between the Parties in connection with criminal proceedings.

Moreover, the Convention stipulates that each Party taking control of radioactive material, devices or nuclear facilities should adopt measures to render harmless such items and ensure that any nuclear material is held in accordance with IAEA safeguards. This article also regulates the return of the seized nuclear material or devices to the Parties concerned.

The Convention is not in force. The Convention shall enter into force on the thirtieth day following the date of the deposit of the twenty-second instrument of ratification, acceptance, approval or accession.

Accept this Convention there is UN Security Council Resolution 1540. It requires states to "develop and maintain appropriate physical protection measures" for nuclear, chemical, biological, and radiological materials.

9. Australia Group

Apart from the prohibitions expressed in the Biological Weapon Convention and Chemical Weapon Convention, several countries, known as the Australia Group, now exercise export controls over materials that could be used to manufacture chemical or biological agents. The group was established in 1985 at the suggestion of Australia and has grown to include some forty western oriented countries. Among the lists of controlled items for export are the 70-odd select biological agents and dual use biological equipment such as centrifuges, fermenters, and freeze dryers.

VIII. NEXT STEPS – POLICY RECOMMENDATIONS

Arguing that the threat of NBC terrorism should be treated as a first-order national security challenge inevitably raises questions about what can, and should, be done by countries about it. To protect all potential targets, all the time, from NBC terrorism is clearly impossible, and should not be attempted. But a purely passive, reactive posture is equally unsatisfactory. The governments of the world's leading countries should instead put in place a package of measures to make NBC terrorist threats less likely to emerge, and should create operational capabilities that give them a reasonable chance of detecting, defeating and minimizing the consequences of specific terrorist NBC threats. These measures should be viewed as a prudent investment in the long-term security of their citizens and national interests, not as an emergency campaign. The response to the threat of nuclear, biological, and chemical terrorism should be vigorous, coherent, and purposeful, but it should also be measured, balanced, and respectful of core democratic values.

Clearly, no two countries will respond identically to the threat of NBC terrorism, as the deficiencies in their governmental organization, policies and operational capabilities vary enormously. Nonetheless, five key prescriptive concepts should guide the policy responses of any government motivated to reduce the vulnerability of its society to NBC terrorism.

Firstly, concerned policy makers and legislators should not overreact – and in particular, should take no action that might compromise the personal liberties and freedoms of the citizenry. The threat of NBC terrorism straddles the traditional domains of law enforcement and national security, and any discussion of how to respond to the terrorist NBC threat will almost inevitably raise uncomfortable questions about the relationship between the state and its citizens. Many of the measures that could be taken to combat terrorist threats would tend to increase the power of the state, at the expense of the freedom and privacy of individuals or groups. An unprepared society's vulnerability to NBC terrorism can be significantly reduced through policy changes, improved government organization, and focused investments in new operational capabilities without undermining essential civil liberties. The threat of NBC terrorism is a serious national security challenge, but it is not so imminent that governments

should preemptively begin to change the nature of the societies they have been charged to protect.

Secondly, before starting new programs and initiatives, the government should have a sound national strategy for addressing the problem, and should put in place a system for effective interagency coordination and long-range planning. This is a particularly marked deficiency in the United States, which has a hodgepodge of disparate policies and operational capabilities directed against the NBC terrorism threat – some quite formidable, others wholly inadequate – of haphazard origin and uncertain future.

Thirdly, intelligence is the first and most important line of defense against terrorist NBC threats. Any effort to reduce a nation's vulnerability to terrorist NBC attacks must, therefore, seek to improve the quality of intelligence collection, analysis, and dissemination on the full range of extant and potential nuclear, biological and chemical weapons threats. As an operational matter, a nation's ability to defend itself from a real threat of terrorist NBC attack will depend most critically on the quality and timeliness of its intelligence. Specific conspiracies are relatively easy to defeat if the authorities learn of their existence ahead of time and in sufficient detail to investigate and take action. Acquiring good intelligence on the full range of potential NBC threats – state and non-state, foreign and domestic, terrorist and military – is a profoundly difficult task, but it must be strongly emphasized because of its great importance to a nation's ability to defend itself from existing and potential threats. Most intelligence services already give some attention to the issue of NBC weapons proliferation. However specific enhancements are needed to acquire early warning of emerging NBC threats, especially by watching for the most likely endorsements of small-scale, improvised NBC acquisition programs, abroad and at home; to improve the use of public-health capabilities – particularly epidemiological surveillance – to detect medical evidence of NBC weapons programs and biological weapons attacks; to identify those responsible for NBC attacks after the incident has occurred; and to cooperate internationally against shared transnational threats.

Fourthly, the single best possible insurance policy against the risk of nuclear terrorism is to ensure that all stockpiles of fissile material (especially highly enriched uranium) and nuclear weapons themselves are properly accounted for and guarded. Safeguarding nuclear weapons

or fissile material in proper facilities is a much simpler task than locating and recovering stolen fissile material, preventing its use in building weapons, and defending against an improvised nuclear weapon used in a terrorist attack. Nuclear terrorism is not a serious threat when all the stockpiles of nuclear weapons and direct-use fissile material are held under secure conditions. However, the degradation of the Soviet nuclear custodial system has heightened the risk of nuclear terrorism by rendering vast quantities of fissile material more accessible than at any other time in history. The problem is of such a scale that it will require a sustained international effort for many years before the risk of insecure former Soviet nuclear material and weapons is brought in line with international standards.

Finally, countries should enhance their operational capacity to detect and mitigate the consequences of chemical and biological weapons attacks at home and, in the case of states with external security commitments, abroad. This should be done not by establishing new stand-alone assets, but by strategically augmenting certain existing capabilities, most of which are independently valuable and worthy targets for further investments. In preparing for biological terrorism, the most important area for capability enhancements is the public health sector, which already has systems in place to detect, contain, and treat natural disease outbreaks – a process known as epidemiological surveillance. Most biological weapons do not cause immediate ill effects, and the symptoms of many biological warfare diseases initially resemble a cough or the flu, so acts of biological terrorism may well be detected first by the existing systems for epidemiological surveillance. Since the effective medical treatment of most biological warfare diseases depends on early detection and prophylaxis, states should invest in improving the speed and accuracy with which their epidemiological surveillance systems can detect unseen biological weapons attacks. Likewise, most states will have to enhance their emergency medical systems so that they are capable of mounting an effective, no-notice medical response in a major biological weapons incident. An exceptionally demanding contingency that would require stockpiles of key medicines and vaccines, trained personnel to deliver them, and a high-readiness mobilization system should be set up in every state.

Unlike biological weapons, chemical warfare agents generally have prompt, noticeable effects on humans, and the chemical incident is likely to play out over a matter of hours rather

than days. For this reason, the most important operational capability for mitigating the effects of an act of chemical terrorism is the "first responder" community, which consists of the local police force, fire departments, hazardous material specialists, emergency medical personnel, and public health and disaster relief officials. In a no-notice chemical weapons attack, there will simply be no time to bring in specialists from around the country to manage the incident. This demanding task will inevitably fall to municipal and state officials, the vast majority of whom have no special knowledge, training, or equipment for dealing with weapons of mass destruction. Of course, one cannot expect all potential first responders in a large country to have an extensive understanding of how to respond to this threat. But it is possible to create a layered system of preparedness, which would start with broad-based awareness training, specialized training and equipment for local specialists, and specialized medical units for large-scale chemical or biological attacks at the regional level. These response capabilities should be regularly tested and examined through full-field exercises against realistic, challenging weapons of mass destruction incidents, with the participation of all relevant federal, state and local agencies.

The military should be tightly integrated into any national preparedness plan of this kind, since the armed forces will generally contain most of a state's technical and operational capacity to counter specific NBC threats, including most of its capacity to operate in a chemically or biologically contaminated environment, to decontaminate casualties, equipment, and facilities, and to treat large numbers of chemical and biological warfare victims. The capabilities needed to manage the consequence of domestic NBC weapons attacks overlap substantially with those needed to fulfill the more traditional mission of protecting military forces on the battlefield and in rear areas against chemical and biological attacks.

The key to keeping terrorists from attacking is to secure NBC weapons and materials so as to prevent their theft or illicit sale. To do this the states need to:

- Use a doctrine of THREE NO'S (*no loose nukes, no new nascent nukes, no new nuclear weapons states.*)
- Work together on International Convention for the Suppression of Nuclear Terrorism.
- Work together on Biological Weapons Convention
- Work together on Chemical Weapons Convention

- Upgrade security at facilities that store NBC materials.
- Work together to secure and reduce tactical nuclear weapons that are most susceptible to terrorist use.
- Increase funding for the 9/11 Commission recommendations, particularly the Cooperative Threat Reduction Program (Nunn-Lugar).
- Ratify the Comprehensive Test Ban Treaty
- Re-energize the Global Threat Reduction Initiative, a 2004 United States initiative to remove NBC materials from vulnerable research facilities
- Expropriate fissile materials to safe havens and blend them down in these havens rather than doing so on location.
- Replace all highly enriched uranium (HEU) with low-enriched uranium LEU, which in effect cannot be used in making bombs, or with other sources of energy. Furthermore, HEU replacement could be accomplished by providing incentives such as large scale foreign investment or foreign aid.
- Prevent trans-national trade and transportation of NBC weapons and the materials from which they can be made.
- Compel rogue states that have NBC weapons to destroy them.
- Help other countries which has not enough finance to improve their control of fissile and radioactive materials.
- Prevent the construction of new facilities that use HEU, rather than condone such construction as legal and legitimate (as it is currently under the NPT).
- Better control of the commercial trade in radioactive sources, both domestically and internationally with enforceable export controls.
- Obtain a UN Security Council Resolution authorizing The Proliferation Security Initiative (PSI).
- Effectively implement UN Security Council Resolution 1540 which requires states to "develop and maintain appropriate physical protection measures" for nuclear, chemical, biological, and radiological materials.

IX. CONCLUSION

The combination of terrorism and NBC weapons poses the gravest threat to national security of all countries. This conclusion is shared by several leading scholars who have recently written about the subject, including Ashton Carter, Matthew Bunn, David Rising, Graham Allison, Thomas V. Inglesby and others.

Reducing the NBC threats of the 21st century will require broad international cooperation to prevent dangerous attack; secure bomb making nuclear materials worldwide, convince countries embarking on nuclear energy programs that they do not need their own enrichment or reprocessing facilities; stop biological and chemical programs; deny terrorists and non-compliant regimes access to international financial markets; or develop a suitable mix of penalties and incentives to induce aspirants to abandon their NBC weapons ambitions. Multilateral measures – whether formal or ad hoc, adopted universally or by smaller groups of states – will be essential. Reliance on multilateral approaches, however, must not mean settling for least common denominator solutions.

A world of increasing numbers of NBC weapons states is not inevitable. Neither is a NBC attack by terrorists. Both can be prevented. But if we are to avoid today's NBC nightmares – as we avoided the NBC nightmare of the Cold War – the prevention of NBC proliferation and NBC terrorism will have to be an overriding national priority, and strong leadership in mobilizing the sustained, concerted efforts required of the international community will be indispensable.

X. BIBLIOGRAPHY

1. Adam Zagorin and Elaine Shannon, *"London's Dirty Bomb Plot,"* Time, 2004.
2. Ashton B. Carter, William J. Perry, and John M. Shalikashvili, *"A Scary Thought: Loose Nukes in North Korea,"* Wall Street Journal, 2003.
3. Bruce Hoffman, *"Terrorism and WMD: Some Preliminary Hypotheses,"* Non-proliferation Review 4, no. 3, 1997.
4. David Rising, *"Iraq Terrorist Calls Scientists to Jihad,"* Associated Press Newswires, 2006.
5. Elena Sokova, William C. Potter, and Cristina Chuen, *"Recent Weapons Grade Uranium Smuggling Case: Nuclear Materials Are Still on the Loose,"* Monterey, Calif.: Center for Nonproliferation Studies, Monterey Institute of International Studies, 2007.
6. Falkenrath, Richard A., Robert D. Newman, and Bradley A. Thayer, "*America's Achilles Heel: Nuclear, Biological, and Chemical Terrorism and Covert Attack,"* Cambridge, Mass.: MIT Press. 1998.
7. George Tenet, "*At the Center of the Storm: My Years at the CIA*," New York: HarperCollins, 2007.
8. Graham Allison, "*Nuclear Terrorism: How Serious a Threat to Russia?*," Journal Article, Russia in Global Affairs online edition**,** 2004.
9. Graham Allison, *"Nuclear Terrorism: The Ultimate Preventable Catastrophe,"* Times Books, 2004.
10. ITO Kenichi, *"The Security Questions in the Post-War Era"* - Keynote Speech Delivered at the International Forum on the History of War, September 18, 2002.
11. Jeronimo Cello, Aniko V. Paul, and Eckard Wimmer, *"Chemical Synthesis of Polio Virus cDNA: Generation of Infectious Virus in the Absence of Natural Template,"* 2002.
12. Kamran Khan and Molly Moore, *"2 Nuclear Experts Briefed Bin Laden, Pakistanis Say,"* Washington Post, 2001.
13. Matthew Bunn**, "***Preventing Nuclear Terrorism: A Progress Update,"* Report, Nuclear Threat Initiative and the Project on Managing the Atom, Harvard University, 2003.
14. Nabi Abdullaev, *"Russia: War Comes to Ingushetia,"* Transitions Online**,** 2004.

15. National Commission on Terrorist Attacks upon the United States, *"The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States,"* 1st ed., New York: Norton, 2004.
16. Ron Suskind, *"The One Percent Doctrine: Deep Inside America's Pursuit of Its Enemies Since 9/11,"* New York: Simon and Schuster, 2006.
17. Simon Saradzhyan, *"Russia: Grasping Reality of Nuclear Terror,"* BCSIA Discussion Paper 2003-2, KSG, Harvard, 2003.
18. The National Security Advisory Group; Wendy R. Sherman, Robert J. Einhorn: *"Reducing Nuclear Threats and Preventing Nuclear Terrorism,"* October 2007.
19. Thomas V. Inglesby, et al., *"Anthrax As a Biological Weapon,"* Journal of the American Medical Association 287, no. 17, 2002.
20. U.S. Institute of Peace, Special Report, *"The Diplomacy of Counterterrorism: Lessons Learned, Ignored, and Disputed,"* 2002.
21. Watanabe Manabu, *"Religion and Violence in Japan Today: A Chronological and Doctrinal Analysis of Aum Shinrikyo,"* Terrorism and Political Violence 10, no. 4, 1998.