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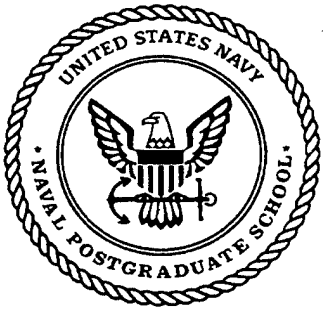

THESIS

EVALUATING STRATEGIES FOR COUNTERING NUCLEAR-ARMED TERRORIST GROUPS

by

Jeff J. Fogarty

December 2000

Thesis Co-Advisors: David S. Yost
James J. Wirtz

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A number of recent studies have concluded that the United States is vulnerable to attack from terrorists armed with weapons of mass destruction (WMD). Depending on the circumstances, a terrorist attack with nuclear or radiological weapons could cause more destruction and casualties than one with other types of WMD. Four strategies for improving U.S. capabilities to counter nuclear or radiological terrorism are often proposed: (1) to improve intelligence capabilities to gain better knowledge of terrorist intentions and capabilities; (2) to improve security measures in nuclear facilities throughout the former Soviet Union (FSU) and elsewhere, so terrorists will have more difficulty acquiring nuclear materials; (3) to deter terrorists from conducting nuclear or radiological attacks, particularly in the United States; and (4) to improve America's response capabilities to terrorists that have already acquired nuclear or radiological weapons. This thesis evaluates current U.S. capabilities and activities in each of these areas and provides recommendations for improving America's counter-terrorism strategies to defend against terrorists armed with nuclear or radiological weapons.

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EVALUATING STRATEGIES FOR COUNTERING NUCLEAR-ARMED TERRORIST GROUPS

Jeff J. Fogarty
Lieutenant, United States Navy
B.S., United States Naval Academy, 1993

Submitted in partial fulfillment of the
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Author: _____
Jeff J. Fogarty

Approved by: _____
David S. Yost, Thesis Co-Advisor

_____
James J. Wirtz, Thesis Co-Advisor

_____
Fredrick Rocker, Chairman
Department of National Security Affairs

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ABSTRACT

A number of recent studies have concluded that the United States is vulnerable to attack from terrorists armed with weapons of mass destruction (WMD). Depending on the circumstances, a terrorist attack with nuclear or radiological weapons could cause more destruction and casualties than one with other types of WMD. Four strategies for improving U.S. capabilities to counter nuclear or radiological terrorism are often proposed: (1) to improve intelligence capabilities to gain better knowledge of terrorist intentions and capabilities; (2) to improve security measures in nuclear facilities throughout the former Soviet Union (FSU) and elsewhere, so terrorists will have more difficulty acquiring nuclear materials; (3) to deter terrorists from conducting nuclear or radiological attacks, particularly in the United States; and (4) to improve America's response capabilities to terrorists that have already acquired nuclear or radiological weapons. This thesis evaluates current U.S. capabilities and activities in each of these areas and provides recommendations for improving America's counter-terrorism strategies to defend against terrorists armed with nuclear or radiological weapons.

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EXECUTIVE SUMMARY

As the United States enters the twenty-first century, it must be prepared to meet the challenge of terrorists armed with nuclear or radiological weapons. Top-level government and military leaders have gone on the record to warn America of the possibility of terrorists using nuclear or radiological weapons in an attack against the United States. The current Secretary of Defense William Cohen and Retired Marine Corps General Anthony Zinni, among others, have publicly expressed their judgments that terrorists armed with weapons of mass destruction (WMD) will attack America in the near future.

Recent studies sponsored by the Center for Strategic and International Studies (CSIS), the Director of Central Intelligence, and a joint Stanford University-Harvard University group explored the threat posed by terrorist groups and WMD. These studies concluded that the United States must improve its capability to defend against a terrorist attack with nuclear or radiological weapons.

This thesis examines four strategies commonly recommended as defenses against terrorists armed with nuclear or radiological weapons. Specifically, this thesis evaluates the probable effectiveness of current intelligence, prevention, deterrence, and crisis management capabilities in protecting the United States from an attack by a terrorist group using nuclear or radiological weapons. The thesis focuses on nuclear and radiological weapons rather than other types of WMD due to the unique effects of these weapons. If a successful attack occurred, the consequence management challenges and procedures could be more complex with nuclear materials than with other types of WMD.

Identifying terrorist groups that might desire to acquire and use nuclear or radiological weapons is an important step in a strategy designed to prevent this type of terrorist attack. Attempting to understand and predict the actions of terrorist groups is difficult, so concentrating efforts only against those few terrorist groups that possess both the motivation and realistic capability to obtain nuclear materials may be the key to interdicting such efforts. Though there are many terrorist groups, only a few have the motivation and capabilities needed to use nuclear or radiological weapons. The United States must identify the terrorist groups that pose a genuine threat of acquiring nuclear or radiological weapons. The United States must then improve intelligence efforts against these terrorists, specifically in the area of human intelligence (HUMINT).

Programs aimed at securing nuclear materials and interdicting smuggling routes could disrupt a terrorists' attempts to use nuclear or radiological weapons to attack the United States. The United States must improve efforts to secure nuclear materials, to employ former Soviet Union (FSU) nuclear scientists, and to improve smuggling interdiction capabilities. To meet these proliferation challenges, the United States supports a number of programs, including the Cooperative Threat Reduction (CTR) program, the Material Protection, Control, and Accounting Program (MPC&A), the International Science and Technology Center (ISTC), the Initiatives for Proliferation Protection (IPP), the Nuclear Cities Initiative (NCI), and the Second Line of Defense (SLD) programs. Each of these programs is briefly evaluated for its potential in stopping terrorist groups from acquiring nuclear materials.

Deterrence is another strategy commonly recommended to protect against terrorists armed with nuclear or radiological weapons. The thesis examines two

possibilities for deterring nuclear or radiological terrorism. First, the United States could use classic deterrence by threatening unacceptable punishment against terrorist groups and the states that support terrorism. Second, the United States could use modified deterrence strategies, such as denying terrorists the ability to easily carry out a nuclear or radiological attack, or increasing law enforcement efforts against traffickers in nuclear materials. By using both classic and modified deterrence strategies, the United States may have a better chance of influencing the behavior of terrorists.

Despite its efforts to deny terrorists the ability to use nuclear or radiological weapons, the United States must still be prepared to combat terrorists armed with such weapons. The United States must improve its capability to intercept nuclear or radiological weapons and to respond to a successful attack. New technologies coupled with improvements in current emergency response teams may provide the United States the ability to detect and locate nuclear or radiological weapons assembled in (or smuggled into) the United States. Improvements also are required for emergency response units at all government levels, starting with the plan that has been promulgated to organize emergency response efforts.

The United States faces a threat from nuclear and radiological terrorism, and should improve its capability to defend itself from this threat. The United States cannot afford to continue hoping that terrorists will not use nuclear or radiological weapons; it must devise strategies against such terrorists. This thesis examines four possible strategies that could improve U.S. counter-terrorism capabilities. The United States should focus resources primarily in the areas that will offer the greatest improvements in defending against terrorists armed with nuclear or radiological weapons. Though better

capabilities in any of the four strategies examined in this thesis would enhance counter-terrorism efforts, improved intelligence and response capabilities could offer the most valuable means to strengthen America's defenses against terrorists armed with nuclear or radiological weapons.

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I. INTRODUCTION

This thesis provides an evaluation of United States capabilities to counter terrorists armed with nuclear or radiological weapons. The main question this thesis addresses is whether the various steps the United States is currently taking can counter a terrorist group that may attempt to use nuclear or radiological weapons in an attack against the United States. The thesis evaluates whether the four most often recommended strategies provide adequate protection and offers recommendations for improvements to those strategies.

Each chapter of this thesis examines one of the strategies often recommended as defense against a nuclear-armed terrorist group. The second chapter focuses on efforts to identify terrorist groups that pose a genuine threat to acquire nuclear materials for use in an attack. The third chapter evaluates efforts to secure nuclear material and to provide opportunities for employment for nuclear scientists from the former Soviet Union (FSU) to enable them to avoid seeking employment from terrorist groups. The fourth chapter focuses on possible efforts to deter terrorist groups and the states that may sponsor them. Finally, the fifth chapter evaluates current capabilities to respond to a terrorist group that has already obtained a nuclear or radiological weapon.

The problem the United States faces is that some terrorist groups may already be able to acquire nuclear materials, but there is no coherent U.S. strategy in place to stop terrorist groups from using nuclear materials in an attack. The most difficult task in obtaining a nuclear or radiological weapon is acquiring the required nuclear materials since the knowledge of how to build a weapon is widely available throughout the world.

There is evidence that terrorist groups can gain obtain nuclear materials, and some analysts predict that these materials could become more available in the future.

Defending against terrorists armed with nuclear or radiological weapons is important because they could cause grave and enduring damage. The United States faces many security challenges, however, and has a limited amount of resources to use in combating this threat. The threat of a terrorist group using nuclear materials in an attack against the United States must be taken seriously and the United States must improve its capability to defend itself in a timely fashion against this threat.

A. DEFINITIONS

A radiological weapon causes contamination with radioactive materials, including those used in medicine and commerce. Nuclear weapons involve an explosion caused by the chain reaction created by fissionable materials.[1] A radiological weapon would probably couple radioactive materials with conventional explosives to spread the radioactivity, whereas a nuclear weapon would use either plutonium or highly enriched uranium (HEU) to create a fission or fusion explosion. Throughout the remainder of this thesis the term nuclear materials refers to the materials required for a radiological or nuclear weapon.

A terrorist group is any sub-national organization (aside from criminal gangs or similar groups that pursue personal enrichment) that uses violence to achieve its objectives. Numerous organizations fit this description, regardless of their political, religious, or social ideology. Also included in this category are racial supremacists and

[1] Bruce Hoffman, *Terrorism and Weapons of Mass Destruction: An Analysis of Trends and Motivations* (Santa Monica, CA: RAND, 1999), 4.

"doomsday cults" that desire to destroy most of the human race and reconstruct a new society based on their beliefs.

B. BASIS FOR STUDY

In 1996 the Center for Strategic and International Studies (CSIS) conducted an exercise named *Wild Atom* designed to evaluate the capability of the United States to defend itself against a terrorist group armed with a nuclear device. After two days of observing participants game a terrorist attack, CSIS analysts concluded that successful interdiction against a nuclear-armed terrorist group would be "extremely difficult" and that "in the end, nothing was decided or even suggested that would have prevented a crude nuclear device from arriving into the United States in two days time."[2] In June of the same year, the Director of Central Intelligence chartered a study to assess the threat posed by terrorist groups using nuclear, biological, and chemical weapons. The CIA-commissioned study concluded that terrorists using weapons of mass destruction (WMD) constitute the threat for which the nation is least prepared, and emphasized that an end-to-end systematic strategy would be the best defense to counter such a threat.[3]

In 1998 the Stanford-Harvard Preventive Defense Project, a joint venture dedicated to studying post-Cold War defense challenges, explored the threat posed by terrorist groups and weapons of mass destruction (WMD). This study's conclusions revealed a lack of confidence in U.S. preparations to address catastrophic terrorism utilizing weapons of mass destruction or intensive cyber assault.[4] The study

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[2] Center For Strategic and International Studies, Global Organization Crime Porject, *Wild Atom: Nuclear Terrorism* (Washington D.C.: Center for Strategic and International Studies, 1998). 40.
[3] "A National Strategy Against Nuclear Terrorism Using Weapons of Mass Destruction." [report on-line]; available from http://www.llnl.gov/str/Imbro.html.
[4] Ashton B. Carter, John M. Deutch, and Phillip D. Zelikow, "Catastrophic Terrorism: Elements of a National Policy" [report on-line] available from http://www.ksg.harvard.edu/visions/gtrept.htm.

recommended intelligence, prevention, deterrence, and crisis management as the pillars of a strategy against catastrophic terrorism. These studies suggest that there is a threat of terrorist groups possibly attacking the United States with nuclear or radiological weapons and that the United States is not prepared to defend itself against such an attack.

These studies provided the motivation for this thesis. Using the conclusions and recommendations of these studies as a starting point, this thesis evaluates the probable effectiveness of current intelligence, prevention, deterrence, and crisis management capabilities in protecting the United States against an attack by a terrorist group using nuclear or radiological weapons. This thesis focuses on nuclear and radiological weapons rather than other types of WMD due to the unique effects of these weapons. Though an attack with any type of WMD would be horrible, nuclear and radiological weapons present unique challenges both in acquisition prevention and crisis response. Nuclear materials are not as readily available as chemical or biological agents, so there is a much greater potential for preventing nuclear materials from reaching terrorist organizations. If a successful attack occurred, the consequence management procedures could be more complex with nuclear materials than with other types of WMD, depending on the specific circumstances.

The United States may be faced with the threat of a terrorist organization armed with nuclear materials. The United States must have the capability to deny terrorists the opportunity to use nuclear or radiological weapons in an attack. This thesis explores the four previously mentioned strategies for countering this threat. If the United States can identify the terrorist groups that pose a genuine threat of acquiring nuclear materials,

improve the security of those materials, deter terrorist groups from using nuclear materials, and improve response capabilities, its security will be greatly enhanced.

C. METHODOLOGY AND STRUCTURE

This thesis evaluates the strengths and weaknesses of present United States capabilities to defend against terrorists armed with nuclear or radiological weapons. It examines the previously mentioned strategies and evaluates their strengths and shortcomings. The thesis relies on a qualitative analysis of primary sources, including books, journal articles, congressional testimony, government publications, and interviews. In some cases, the thesis draws on analyses and opinions of experts found in secondary sources to provide additional insight.

The second chapter of this thesis evaluates the ability of intelligence agencies to identify terrorist groups that may pose a genuine threat of acquiring nuclear materials. The United States does not possess the resources to take preventive action against every single terrorist organization. There are simply too many organizations in existence, the vast majority of which either would not or could not gain access to nuclear materials. If the United States could identify the few terrorist groups that pose a nuclear or radiological threat, it could focus its interdiction efforts against them. The thesis recommends improving human intelligence (HUMINT) capabilities and revising national counter-terrorism policy to improve the intelligence community's ability to determine terrorist motivations and capabilities.

Chapter III focuses on efforts to keep nuclear materials and scientists out of the hands of terrorist organizations. Terrorists with access to the internet or a library can obtain detailed plans on how to build their own primitive nuclear or radiological bombs.

Acquiring nuclear materials is far more difficult, though by no means impossible. Many reports of nuclear materials smuggling and of nuclear scientists leaving the former Soviet Union have surfaced over the last ten years. Chapter III evaluates the current efforts by the United States to improve the security of nuclear materials in the FSU and to keep former Soviet scientists employed in government facilities.

Chapter IV of this thesis evaluates prospects for deterring terrorist groups from using nuclear or radiological weapons against the United States. The United States could attempt to use the classic punitive deterrence approach (that is a threat of retaliation) against both the terrorists and any nation-states sponsoring them. Using threats of punishment against terrorist groups may be very difficult, so this thesis investigates the possibility of using forms of deterrence other than solely the threat of retaliation.

In view of the potential failure of prevention efforts, the United States must be prepared to defend against nuclear-armed terrorist groups. Chapter V evaluates current U.S. capabilities to interdict terrorist groups already in possession of nuclear or radiological weapons and to respond to such attacks. The thesis evaluates the potential for U.S. response teams to intercept a nuclear or radiological weapon before it is used in an attack. The chapter concludes with recommendations to improve current response capabilities.

The thesis concludes with a short chapter recommending the adoption of a single overall strategy integrating all these efforts under the responsibility of a single government department. Currently the United States is not ready to meet the threat posed by a terrorist group armed with a nuclear or radiological weapon, and it must adopt a strategy to counter this threat. Defending the United States from terrorists armed with a

nuclear or radiological weapon should not be based upon ad hoc decisions in the midst of a crisis. The United States should therefore adopt a more comprehensive strategy against terrorist groups seeking to use nuclear materials in an attack.

This thesis is based on the assumption that at some point terrorist groups will try to use a nuclear or radiological weapon. Some terrorism experts have argued that terrorists could not or would not use radiological or nuclear weapons, and that attempts to defend against such an attack are a waste of resources. The thesis is based on the assumption that, even though most terrorist groups would not use such weapons, the past ten years have witnessed new types of terrorists whose actions do not conform to historical patterns. Simply because no terrorist group has to date attempted to attack the United States with nuclear materials does not mean that terrorists may not attempt to use these types of weapons in the future.

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II. IDENTIFYING TERRORIST GROUPS THAT MIGHT ACQUIRE NUCLEAR MATERIALS

Identifying terrorist groups that might desire to acquire and use nuclear or radiological weapons is an important first step in a strategy designed to prevent a nuclear terrorist attack. Attempting to understand and predict the actions of terrorist groups is very difficult, so concentrating efforts only on those few terrorist groups that possess both the motivation and realistic capability to obtain nuclear material may be the key to interdicting such efforts. As Senator Orrin Hatch, Chairman of the Senate Judiciary Committee, stated in a hearing on the U.S. counter-terrorism policy:

> In order to fight this war, we need to have an assessment of the magnitude of the anticipated threat from international terrorists to U.S. interests, persons, and property both at home and abroad. We need to determine the composition of the major terrorist organizations and their leadership. Additionally, it is crucial that we maximize the development of information relating to...their intent or capabilities to access weapons of mass destruction, which increasingly seem to be of great concern. Without an adequate assessment of the threat, it is impossible to have a functioning strategy to counter that threat.[5]

The effects of nuclear and radiological weapons are so horrific that they do not suit the purposes of most terrorist groups. In addition, nuclear materials are not easy to obtain and many terrorist groups do not possess the financial and technical resources required for these types of weapons. Understanding the motivations and capabilities of the few terrorist groups that could acquire nuclear materials will assist in defining a defense strategy by limiting necessary counter-terrorism and interdiction efforts.

A. NUCLEAR USE MOTIVATIONS

Identifying terrorist groups that desire to use nuclear or radiological weapons is

[5] U.S. Congress, Senate, Committee on the Judiciary, *U.S. Counter-terrorism Policy*, 105th Cong., 2nd sess., 3 September 1998, 2.

difficult since there are few precedents for terrorists attempting to use these weapons. On 23 November 1995, Russian authorities discovered that a Chechen guerilla leader, Shamyl Basayev, had placed a thirty-two kilogram case of caesium that emitted 310 times the normal amount of radioactivity in Moscow's Ismailovo Park.[6] The terrorist group Aum Shinrikyo also entertained visions of using nuclear weapons to achieve its goals, but fortunately was not able to succeed in its attempts to acquire nuclear materials. These examples illustrate that there are some groups that desire to use nuclear materials in a terrorist attack. Two types of terrorist groups may be more likely to desire nuclear materials and must therefore be closely monitored: (a) religious terrorists and (b) supremacists and "doomsday" cults.

1. Religious Terrorism

Religious terrorists could find the use of nuclear materials in an attack attractive because they are often not concerned about the public's perception of the attack. Most secular terrorists use violence as a means to send a message to a certain target audience, whereas religiously motivated terrorists may only be concerned with how their actions are judged by what they consider to be divine authority. Whereas usually the symbolic and audience-oriented aspects of terrorism are separate, in the case of religious-inspired violence the two are synonymous. The need to gear action to what the terrorist believes the human audience considers appropriate is therefore removed as a constraining influence in religious terror. This clearly increases the possibility that religion could be used as a justification for nuclear terrorism.[7]

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[6] Gavin Cameron, "Nuclear Terrorism: A Real Threat?" *Jane's Intelligence Review* 8, no. 9 (September 1, 1996): 422.

[7] Gavin Cameron, *Nuclear Terrorism* (New York: St. Martin's Press, Inc., 1999), 89.

Religious terrorists also seem to view the world through a black and white paradigm, dividing the world into people that are either saved or condemned. The struggle is often perceived as an all-out fight between good and evil, believer and non-believer, justice and injustice, order and chaos. This type of outlook is critical in justifying violence generally; but, as with secular terrorism, it can also be used to justify great acts of terror. The intensity and importance of this battle can be used to justify the levels of violence employed.[8] This absence of a secular constituency leads to the sanctioning of almost limitless violence against a virtually open-ended category of targets that may include anyone who is not a member of the terrorist's religion or religious sect.[9] This ambivalence toward their victims could lead religious terrorists to use indiscriminate weapons that cause mass casualties to achieve their goals.

Religious terrorism is becoming more common and more lethal. In a joint RAND-St. Andrew's University study, religious terrorist groups were found to increase as a portion of all terrorist groups from two of sixty-four (three percent) in 1980 to twenty-six of fifty-six (forty-six percent) by 1995.[10] Not only have religious terrorist groups increased in number, over the past ten years they have been almost exclusively responsible for the increasing lethality of terrorist attacks. Some of the most significant terrorist acts of recent years have included a religious element. They include:

- The 1993 bombing of New York City's World Trade Center by Islamic radicals who deliberately attempted to topple one of the twin towers onto the other;
- The series of thirteen near-simultaneous car and truck bombings that shook Bombay, India in February 1993, killing four hundred persons and injuring more than one thousand others;

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[8] Magnus Ranstorp, "Terrorism in the Name of Religion," *Journal of International Affairs* 50, no.1 (Summer 1996): 52.
[9] Hoffman, *Terrorism and Weapons of Mass Destruction*, 27.
[10] Ibid., 22.

- The March 1995 sarin nerve gas attack in the Tokyo subway system by an apocalyptic Japanese religious cult that killed a dozen persons and injured more than five thousand others;
- The April 1995 bombing of an Oklahoma City Federal building by two Christian Patriots where one-hundred sixty-eight persons perished;
- The June 1996 truck bombing of a U.S. Air Force barracks in Dhahran, Saudi Arabia, where nineteen persons perished, by religious militants;
- The bombings of the U.S. embassies in Kenya and Tanzania in August 1998 that killed 257 and injured some five thousand others.[11]

Although the terrorists used WMD in only one of these attacks, in recent history terrorist attacks have become more lethal, almost exclusively due to religious terrorists. If this trend were to continue, religious terrorists could seek more lethal ways to conduct attacks, perhaps even turning to nuclear or radiological weapons.

2. Supremacists and "Doomsday" Groups

Supremacist terrorist groups might desire to use nuclear or radiological weapons to achieve their goals. Supremacists do not rely so heavily on religion as a legitimizing force for their actions. Supremacists instead believe that they are the ultimate secular authority. They believe it is their duty to bring about the end of government and create a new world order. In contrast, "doomsday cult" terrorists would like to give history a push, helping create world-ending havoc replete with universal war, famine, pestilence, and other scourges. They believe the sooner the reign of the Antichrist is established, the sooner this corrupt world will be destroyed and a new heaven and earth will be realized.[12]

Supremacist groups have already displayed a desire to use WMD in terrorist attacks. A white supremacist group stockpiled cyanide, which it planned to dump in the reservoirs in Washington, D.C., and Chicago, thereby poisoning those cities'

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[11] Ibid., 23-25.
[12] Walter Laqueur, "Postmodern Terrorism," *Foreign Affairs* 75, no.5 (September-October 1996): 32.

populations.[13] In March 1995 two members of the Minnesota Patriots Council, a militia-type organization, were convicted of attempting to kill federal officials by mixing ricin with a solvent which would be absorbed through the skin.[14] Though neither of these attempted operations resulted in a successful mass casualty attack, they are evidence that these types of groups are willing to use unconventional methods.

The combination of religious beliefs and a desire to destroy the world could inspire another possible type of terrorist organization that could want to use nuclear or radiological weapons. Aum Shinrikyo exemplified the combination of these influences. Aum's goal in staging the nerve gas attack was to lay down the foundations for a revolt against the Japanese government that would result in the creation of a new regime dedicated to the service of the sect's founder and leader, Shoko Asahara.[15] The combination of religious and right wing violence, which occurs among white supremacists in North America and in Jewish groups such as Kach, can be more dangerous. The possibility that they might move from chemical to nuclear weaponry is a real one that cannot be discounted.[16]

3. Desire For Increased Publicity

Terrorist groups may desire nuclear weapons to gain publicity. Most terrorist groups use violent attacks as a means to attract attention to their cause, hoping to attract sympathy to or at least empathy for their group and its beliefs. The increase in the number and lethality of terrorist attacks could lead some groups to attempt attacks that will create more publicity, causing an upward spiral of violence in terrorist attacks. The

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[13] Hoffman, *Terrorism and Weapons of Mass* Destruction, 28.
[14] Cameron, *Nuclear Terrorism*, 116.
[15] Hoffman, *Terrorism and Weapons of Mass Destruction*, 3.
[16] Cameron, *Nuclear Terrorism*, 116.

ability of terrorists to attract a widespread audience hinges on two factors: either they must involve victims of interest to the world's media, which probably means citizens of Western countries, or the implications or scale of the attack must be so immense that it will be covered for its own sake.[17]

In the past, exploding a car bomb or blowing the windows out of a small shop may have been adequate to create the publicity desired by the terrorists. In the past ten years, however, terrorists have resorted to poisoning the air in subway systems and blowing up entire buildings to gain attention, thus possibly raising the bar of how much violence is needed to obtain publicity. For example, on 31 January 1996, a suicide bomber exploded a truck bomb with five hundred kilograms of high explosive in Sri Lanka, killing over one hundred people and injuring more than one thousand others. By 2 February this incident was not even covered on the front page of the *New York Times*.[18] In contrast, the bombings of the Federal Building in Oklahoma City and the 1998 bombings of the United States embassies in Africa received widespread press coverage in the United States. Newspapers continue coverage on the anniversaries of the incidents. Even the report that Usama bin Laden has possibly acquired enriched uranium was only covered on page A3 of the *New York Times*.[19]

Some terrorists may believe that they need to create a more spectacular display in order to achieve the coverage they desire. They may judge that both the public and the media have become increasingly inured or de-sensitized to this spiral of violence. Accordingly, these terrorists may believe that it is necessary to undertake even more

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[17] Ibid., 65.
[18] Ibid., 65.
[19] Benjamin Weiser, "U.S. Says Bin Laden Aide Tried to Get Nuclear Material," *New York Times*, 26 September 1998, A3.

dramatic or destructively lethal deeds to achieve the same effect that a less ambitious action may have had in the past.[20] This equation of publicity and carnage with attention and success may lock some terrorists into an unrelenting spiral of violence to retain the media's attention and the public's interest.[21] In speaking of the sarin attack by Aum Shinrikyo, one analysis drew a similar conclusion, noting that "it breaks a taboo and has psychological import. Others will ask whether such tactics should be adopted by them. It is now more likely that at least some will say yes."[22]

B. NUCLEAR MATERIAL ACQUISITION CAPABILITY

Motive, however, is not the only requirement for a terrorist group to use nuclear material in an attack. A terrorist group would have to not only desire radiological or nuclear weapons, but would also have to possess the capabilities required to use such weapons. Safely obtaining and employing nuclear materials are not easy tasks, so a terrorist group would need personnel with the necessary technical expertise to handle the dangerous materials. Only a few terrorist organizations either possess or have the potential to obtain the necessary financial and technological assets required for nuclear materials. Determining which terrorist groups represent a genuine threat to be able to acquire nuclear materials is the key to focusing interdiction efforts against these groups.

Any terrorist group that would realistically be capable of acquiring a nuclear or radiological weapon would require a substantial financial network, and would need to have people who know how to handle nuclear materials safely. These requirements eliminate many terrorist groups as possible threats to acquire nuclear materials. Only the richest and most powerful terrorist organizations and those who may be sponsored by a

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[20] Hoffman, *Terrorism and Weapons of Mass Destruction,* 20.
[21] Ibid., 21.

nation state with access to nuclear materials can be considered a genuine threat in terms of nuclear or radiological weapons.

1. Self Supporting Terrorists

The State Department's *Patterns of Global Terrorism 1999* designates twenty-eight Foreign Terrorist Organizations (FTOs) as active terrorists, plus an additional sixteen terrorist groups whose activities were not severe enough to be designated FTOs. A terrorist organization that has access to its own financial assets (or that receives contributions from a network of sympathizers) or a loose organization of terrorist groups that can pool their resources must be considered capable of acquiring nuclear materials. Of the twenty-eight designated FTOs, only a few meet these financial requirements.

Due to their contact with multi-millionaire terrorist Usama Bin Laden and their worldwide support structure, the Abu Nidal Organization, al-Jihad, and al-Qaida possess the financial assets needed to acquire nuclear materials and to support an infrastructure capable of safely handling and transporting nuclear materials. Hezbollah has over 1,000 members operating in Europe, North and South America, Africa, and Asia. It also has a recent history that includes the 1983 bombing of the U.S. Marine Barracks in Beirut and possibly the 1996 bombing of a U.S. Air Force compound in Saudi Arabia. Aum Shinrikyo reportedly had assets in excess of one billion dollars and over 40,000 members, including people in Russia, China, Europe, and the United States.[23] The Liberation Tigers of Tamil Eelam (LTTE) have an estimated 10,000 armed combatants with an undetermined amount of overseas support, according to a State Department report. Even

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[22] Cameron, "Nuclear Terrorism: A Real Threat?" 422.
[23] Ibid., 422.

though both Aum Shinrikyo and the LTTE have used WMD in past attacks, their recent behavior seems to indicate they are unlikely to target the United States in the future.[24]

Exactly what assets are required for a terrorist to acquire nuclear or radiological weapons is a question that must be addressed when determining which terrorists might obtain nuclear materials. Given the presumed need for anonymity and complete security, terrorists would probably build a bomb rather than steal a functioning nuclear device.[25] For a gun-type nuclear weapon some scientists estimate that about ten kilograms of highly enriched uranium (HEU) could produce a twenty-kiloton explosion, while some University of California researchers claim that only three kilograms of HEU would be sufficient. For an implosion weapon, about nine kilograms of plutonium is required, though the engineering of this type of weapon is much more difficult than that of the gun-type weapon.[26]

Determining exactly what acquiring nuclear material would cost a terrorist is difficult, though past foiled smuggling incidents provide a basis for an estimate. When Russian Navy Captain Alexiei Tikhomirov stole 4.5 kilograms of HEU from a Sevmorput shipyard in 1993, he hoped to receive $50,000 for the material.[27] Other reported cases of smuggling have priced lesser quantities of uranium in the $600,000-$700,000 range.[28] As recently as June 2000, a Russian newspaper reported that two Kazakh nationals were

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[24] The LTTE use of WMD consisted of a chlorine gas attack in June 1990. See Hoffman, *Terrorism and Weapons of Mass Destruction*, pp. 47-48.
[25] Cameron, *Nuclear Terrorism*, 131.
[26] "The Feasibility of Building a Terrorist Nuclear Weapon," *Jane's World Insurgency and Terrorism* [journal on-line];available from http://fore.thomson.com/janes.
[27] Oleg Bukharin and William Potter, "Potatoes Were Guarded Better," *Bulletin of the Atomic Scientists* 51, no.3 (May/June 1995) [journal on-line] available from http://www.bullatomsci.org/issues/1995/mi95_bukharin.html.
[28] Rensselaer Lee, "Smuggling Update," *Bulletin of the Atomic Scientists* 53, no. 3 (May/June 1997): 11.

arrested for attempting to sell a capsule of osmium 187 for $60,000 a gram.[29] Though some of these prices are dated, they prove that some terrorist organizations have the financial assets to obtain the materials required for a nuclear or radiological weapon.

A terrorist organization would also need access to personnel with the technical ability to safely handle the nuclear materials to construct a weapon. Again, the worldwide terrorist network of al-Qadid, al-Jihad, Abu-Nidal, Hezbollah, and Aum Shinrikyo could afford to recruit nuclear scientists. The trial of Aum Shinrikyo revealed that the group had recruited three nuclear scientists and had sent its engineer to Russia thirteen times to inquire about the price of nuclear material.[30] Usama Bin Laden is also reported to be recruiting Russian nuclear scientists by offering former Turkmenistan scientists $2,000 a month to work in Afghanistan.[31]

2. State-Sponsored Terrorists

Another category of terrorist groups that might obtain nuclear materials consist of those that receive assistance from nation states, especially states with nuclear programs. *Patterns of Global Terrorism 1999* identifies seven states as sponsors of terrorism: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria. Of those states, North Korea has nuclear programs, while Cuba, Iran and Iraq are attempting to acquire either civilian or military nuclear programs. Of the FTOs listed in the report, Hezbollah, HAMAS, the Kurdish Worker's Party, and Abu Nidal are known to receive support from Iran, though Hezbollah is believed to probably carry out some operations without Tehran's

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[29] U.S. Department of Energy. Office of International Materials Protection and Emergency Cooperation. *Illicit Trafficking of Nuclear Materials Monthly Status Report* (June 2000); 5.
[30] U.S. Congress, House of Representatives, Military Research and Development Subcommittee, *Nuclear Terrorism and Countermeasures,* 105th Cong., 1st sess., 1-2 October 1997, 30.
[31] Emil Torabi. "Bin Laden's Nuclear Weapons," Complied from *Al-Watan al-Arabi, Al-Majalla, and Al-Wasat* in *Muslim Magazine*, winter 1999 [magazine on-line]; available from http:www.muslimmag.org/winter99/34_36.pdf.

knowledge. The Palestine Islamic Jihad and Mujahedin-E Khlaq both receive support from Iraq. North Korea, which has a nuclear program, is not listed as a sponsor to any specific terrorist group, although it is believed that Pyongyang may sponsor some terrorist operations.

State-sponsored nuclear terrorism may be less of a threat than a terrorist group that can work independently. A nation's nuclear program is monitored by the International Atomic Energy Agency (IAEA) if it is a signatory to the Nuclear Nonproliferation Treaty (NPT). Moreover, the United States can more easily use its military as a deterrent toward governments than toward non-state actors. After the 1990-1991 Gulf War,however, the UN Special Commission uncovered a clandestine nuclear program in Iraq, which was (and remains) a signatory to the NPT.

By giving a terrorist group a nuclear or radiological device, a state could deny responsibility for an attack. A state also might use the terrorist group as a weapon or deterrent during a conflict in which the state had little hope of defeating the United States with conventional military forces. For the seven states listed, terrorist activity may provide the only realistic method for launching an attack against a more powerful enemy.[32] State sponsorship also may provide the financial and technical support necessary to acquire a nuclear or radiological weapon to a terrorist group that otherwise would not have access to these assets.

C. INTELLIGENCE EFFORTS AGAINST TERRORIST GROUPS

The current United States counter-terrorism policy has four tenets:

- First, make no concessions to terrorists and strike no deals.
- Second, bring terrorists to justice for their crimes.

[32] "Potential Nuclear Terrorists." *Jane's World Insurgency and Terrorism* [report on-line]; available from http:fore.thomson.com/janes. (05 August, 1999).

- Third, isolate and apply pressure to states that sponsor terrorism to force them to change their behavior.
- Fourth, bolster the counter-terrorist capabilities of those countries that work with the United States and require assistance.[33]

There are two major flaws in this policy. The first two tenets are reactive and only apply after a terrorist attack has taken place while the second two tenets focus on improving security overseas rather than improving counter-terrorist efforts in the United States. The United States must adopt more aggressive intelligence policies against terrorists to discover and interdict nuclear or radiological weapons before they arrive in the United States. Despite technical intelligence systems such as satellite photography and signal interceptors, they cannot give a complete picture of the intentions and capabilities of terrorist organizations. In testifying before Congress, former Central Intelligence Agency (CIA) director James Woosley noted that "there is no substitute for human intelligence" but HUMINT is "expensive and hard."[34] The participants in the *Wild Atom* analytic exercise noted "if we are going to get there before a (terrorist) bomb goes off we must have the intelligence to do it," and "technical collection can make important contributions, but is not likely to reveal fully what terrorists and other underground groups are up to."[35]

The National Commission on Terrorism noted that improvements are needed in the area of HUMINT operations. Specifically, the commission noted that, since inside information is the key to preventing attacks by terrorists, the CIA must aggressively recruit informants with unique access to terrorist plans. The commission recommended that the Director of Central Intelligence "make it clear aggressive recruitment of human

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[33] U.S. Department of State, *Patterns of Global Terrorism 1999* (April 2000) [report on-line]; available from http://www.state.gov/global/terrorism/1999report/appb.html.
[34] U.S. Congress, Senate, *U.S. Counter-terrorism Policy*, 56.

intelligence sources on terrorism is one of the intelligence community's highest priorities."[36] According to U.S. Air Force Director of Intelligence, Surveillance, and Reconnaissance, Major General John Casciano, "the intelligence community must do a better job in developing collection targets associated with WMD and then allocate the human resources to go after them."[37]

Another area of HUMINT that requires improvement is the number of foreign linguists employed in the intelligence community. The National Commission on Terrorism found all United States government agencies face a drastic shortage of linguists to translate raw data and recommended that the Director of Central Intelligence develop a larger pool of linguists and an interagency strategy for employing them.[38] This need for linguists is especially important to uncover terrorist plots that may be operating from multiple countries and using numerous languages when communicating between factions.

The major problem with using HUMINT sources to uncover terrorist plots is that in many cases intelligence officers and law enforcement authorities cannot recruit the best people to get inside information on terrorist organizations, the terrorists themselves. As stated earlier, the first tenet of the U.S. counter-terrorism policy is to make no concessions to terrorists and strike no deals. This strategy may have some deterrent value, a judgment which is explored in Chapter IV, but (depending on how it is construed) it may work against the ability of intelligence agencies (specifically the CIA)

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[35] CSIS Global Organized Crime Project, *Wild Atom,* 46.
[36] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism.* [report on-line]; available from http://www.fas.org/irp/threat/commission.html.
[37] John P. Casciano, "Intelligence Challenges," in *Countering the Proliferation of Weapons of Mass Destruction*, eds. Peter L. Hays, Vincent J. Jodoin, and Alan R. Van Tassel (New York: McGraw Hill, 1998), 295.
[38] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism.*

to collect information against terrorists. Inside information is the key to preventing attacks by terrorists. The CIA must recruit informants with unique access to terrorists' plans. That sometimes requires recruiting those who have committed terrorist acts or related crimes, just as domestic law enforcement agencies routinely recruit criminal informants to pursue major criminal figures.[39]

The United States should amend its counter-terrorism policy to allow intelligence and law enforcement agencies to recruit terrorists as informants. Using terrorists as an intelligence source may allow the United States to gain more insight on the motivations and capabilities of terrorist organizations. In testifying on intelligence's role in counter-terrorism before Congress, former CIA director Woolsey stated:

> If one is going to recruit spies inside terrorist organizations, one is going to have to pay money and otherwise deal with some rather ugly people. But, as a general proposition, we should not be operating under guidelines that deter at all our case officers ability to recruit informants, spies, inside terrorist organizations based upon those terrorists' past behaviors.[40]

Priority one is to prevent terrorist attacks. United States intelligence and law enforcement agencies must therefore use the full scope of their authority to collect intelligence regarding terrorist plans and methods.[41]

Collecting information is key to understanding the motivations and capabilities of terrorist groups. Infiltrating these groups with informants is very difficult, but HUMINT efforts are the best way to understand what the terrorists are up to. By identifying the terrorist organizations that pose a genuine threat of acquiring nuclear material for weapons, the United States can limit number of terrorist groups that need to be targeted.

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[39] Ibid.

[40] U.S. Congress, Senate, *U.S. Counter-terrorism Policy*, 46.

[41] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism*.

The United States should increase the HUMINT capability of its intelligence agencies, most specifically the CIA, and change the tenets of its counter-terrorism policy to recruit terrorists as informants to get a better knowledge of the terrorist groups that pose a threat of using nuclear materials. Given the seriousness of the possibility of terrorists with the capability of using nuclear or radiological weapons against the United States, in some cases preventing future attacks must take priority over punishing past actions.

In sum, compelling new motives, such as those raised by religious terrorism, coupled with increased opportunities (e.g., greater and/or easier access to critical information and key components) to obtain enhanced capabilities, could portend an even bloodier and more destructive era of violence than before.[42] There are too many terrorist groups active in the world for the United States to attempt to infiltrate all of them to discover their intentions. The increasing lethality of terrorist attacks demands the United States increase intelligence efforts against terrorist groups that can threaten its population with a nuclear or radiological weapon.

[42] Hoffman, *Terrorism and Weapons of Mass Destruction*, 35.

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III. SECURE NUCLEAR MATERIAL AND INTERDICT SMUGGLING

Programs aimed at securing nuclear materials and interdicting smuggling routes could offer the most promising method of disrupting a terrorist group's attempts to use nuclear or radiological weapons in an attack against the United States. Building a nuclear or radiological weapon is not easy, because nuclear materials are not widely available on the open market and are kept under tight security throughout most of the world. Safely handling nuclear materials requires a great deal of specialized knowledge that most people do not possess. Any attempt to transport nuclear materials would have to be done carefully and clandestinely to avoid the dangers of radiation exposure and arrest by the authorities. If the United States could better assist other countries in safeguarding their nuclear materials, employing nuclear scientists, and interdicting smuggling routes, the threat of a terrorist group using nuclear materials in an attack could be significantly reduced.

A. SECURE NUCLEAR MATERIALS

Though the Comprehensive Test Ban Treaty (CTBT) lists 44 nations that possess either military or civilian nuclear programs, the nations that pose the most serious threat of "nuclear leakage" are the former Soviet Union (FSU) states, especially Russia. Russia has numerous civilian nuclear power plants, nuclear weapons storage facilities, nuclear research complexes, and retired nuclear submarines awaiting dismantlement. Each of these facilities contains nuclear materials that could be used by a terrorist group. The large number of nuclear facilities throughout Russia coupled with the evidence of substandard security at some of these facilities illuminates the need for improvements in security.

There have been a number of documented cases involving stolen nuclear materials from facilities within the FSU. Although the majority of theft attempts turned out to be shams and the authorities apprehend most thieves, no one can know exactly how many of these thefts transferred nuclear materials to buyers. At least three thefts have provided grounds for concern because they were confirmed thefts of enough weapons-grade material to produce a functional nuclear weapon. In the first case, Naval Captain Alexi Tikhomirov stole 4.5 kilograms of HEU by slipping through a hole in a fence of the Sevmorpt Shipyard and cutting a padlock which served as the only security guarding the uranium.[43] The second case involved the 1992 theft of 3.7 pounds of HEU by an employee of the Luch Scientific Association.[44] The final case was the discovery by German authorities of 5.6 grams of plutonium in the garage of a suspected criminal in May 1994.[45] To date there have been 455 known cases of nuclear materials thefts that include fourteen involving weapons grade nuclear materials. The most recent theft of weapons grade nuclear materials was in April 2000.[46]

Another cause for concern is the claim by former Russian National Security Advisor Alexander Lebed that 84 "suitcase nuclear bombs" are missing from Russian inventories. According to Lebed, these 20x40x60cm bombs look like briefcases and can be activated by a lone operator without any need for authentication codes.[47] If these

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[43] Bukharin and Potter, "Potatoes Were Guarded Better."
[44] Gavin Cameron, *Nuclear Terrorism: A Threat Assessment for the 21st Century* (New York: St. Martin's Press, 1999), 7.
[45] William C. Potter, "Nuclear Leakage from the Post-Soviet States," in *Pulling Back From the Nuclear Brink: Reducing and Countering Nuclear Threats*, eds. Barry R. Schneider and William L. Dowdy (London: Frank Cass, 1998), 110.
[46] U.S. Department of Energy, *Illicit Trafficking of Nuclear Materials*, 8.
[47] Moscow's NTV aired a report on these weapons on 22 September 1999. In the video, a person carried what appeared to be a normal briefcase into a room and set it on a table, then opened the briefcase to show a small control panel that contained a few push buttons.

"suitcase nukes" do exist (Russian authorities have denied that they were built but American scientists have testified that they could be constructed), a terrorist group that obtained one would have a functional nuclear weapon that would be almost impossible to locate once it was deployed.

An additional cause for concern is the possibility that if the United States does not help FSU nations secure their nuclear materials, terrorist groups may find it even easier to obtain them. As questionable as security at nuclear facilities throughout the FSU has been in the past, there are indications that security could become more unsatisfactory in the future. For example, by the year 2010, Russia will have commissioned ten new nuclear-powered icebreakers that use HEU for propulsion. This HEU will not even be under the questionable security of Russia's military complex but will be controlled by the civilian company that operates the icebreakers. Some analysts predict that economic and social conditions in Russia may continue to decline. If Russia falls on even harder times, the nuclear materials in Russia may be even more susceptible to theft; and the risk that a terrorist group could gain access to nuclear materials may increase.

1. Cooperative Threat Reduction

The United States has recognized the dangers associated with poor nuclear materials security and has attempted to devise solutions to this problem. The Department of Defense's Cooperative Threat Reduction (CTR) program is designed to assist FSU countries in dismantling their chemical, biological, and nuclear arsenals. CTR has led to the creation of over fifty joint projects that range from "assisting in the dismantlement of thousands of strategic launchers" to chopping up Russian strategic bombers. CTR has also explored ways to seal permanently the test tunnels at the former Soviet nuclear

weapons test site at Semipalatinsk.[48] It should be noted that the Russians no longer use this test site and rely instead on the site at Novdyd Zemlya. CTR played a role in the transfer of over 1,000 nuclear warheads from Belarus, Kazakhstan, and Ukraine to Russia, the transfer of over 2,500 Russian nuclear warheads from readiness to storage, and the elimination of over 630 bombers and ICBM launchers.[49]

The major weakness of the CTR is that it focuses solely on strategic nuclear weapons and their delivery systems. Though the elimination of these weapons and delivery systems is important, there should be a greater emphasis placed on securing all nuclear materials, including those in reactors and propulsion systems, as well as from dismantled warheads. Despite Russia's nuclear security problems, there has never been a known case of a functional nuclear weapon being stolen. A bomber or a missile is not the only way the United States could be attacked with a nuclear or radiological weapon, yet these threats are the only ones the CTR attempts to eliminate. Removing nuclear weapons from ICBMs (mobile and silo-based) and from submarines, where they have historically been safe, to storage facilities with questionable security may not be the best way to improve the security of the United States.

The CTR does little to help the United States improve its security vis-à-vis terrorists because it does not secure the majority of Russia's nuclear materials. The CTR could be a more effective asset in the fight against nuclear terrorism if it shifted its focus from strategic weapons to all nuclear materials. Researchers at the

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[48] Gloria Duffy, "Cooperative Threat Reduction in Perspective" in *Dismantling the Cold War: U.S. and NIS Perspectives on the Nunn-Lugar Cooperative Threat Reduction Program*, eds. John M. Shields and William C. Potter (Cambridge, MA: The MIT Press, 1997), 25.

[49] "CTR Accomplishments," in Department of Defense's defenselink website [report on-line]; available from http://www.defenselink.mil/pubs/ctr/accomplish.html.

Center for Nonproliferation Studies have calculated that by the year 2003 there will be sufficient surplus quantities of plutonium from dismantled FSU nuclear weapons to construct nearly 40,000 primitive nuclear bombs.[50] If the Department of Defense expanded its definition of threat to include all nuclear materials that are not properly secured and used the CTR to assist FSU states in securing this material, the chances that a terrorist organization could acquire nuclear materials would be reduced.

2. Material Protection, Control, and Accounting Program

A second program the United States uses to improve nuclear material security is the Department of Energy's Material Protection, Control, and Accountability Program (MPC&A). The MPC&A program assists Russia and other FSU nations by providing systems that limit access to and detect theft of nuclear materials. These systems include portal monitors and other devices to control access to storage sites. Material control is also achieved through the use of secure containers for nuclear materials, seals, and identification codes that make it possible to verify the location and condition of nuclear materials.[51]

The MPC&A program has been responsible for some impressive victories in the struggle to secure nuclear materials. 36 tons of Russian HEU has been blended down and delivered to America for use as reactor fuel, enough nuclear material for over 1500 nuclear weapons.[52] The MPC&A program has established improved security programs through joint ventures in 62 nuclear facilities throughout Ukraine, Kazakhstan, and

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[50] Center for Nonproliferation Studies estimate quoted by Bruce Hoffman and David Claridge, "Illicit Trafficking in Nuclear Materials," *Conflict Studies* 314/315 (January/February 1999): 10.
[51] U.S. Department of Energy, *MPC&A Program Strategic Plan*. (Washington D.C.: Government Printing Office, 1998), 5.
[52] Prepared remarks of U.S. Secretary of Energy Bill Richardson, given at the 7th Carnegie International Non-proliferation Conference. Washington D.C., 11-12 January 1999 [speech on-line]; available from http://www.ceip.org/programs/npp/richardson.htm.

Russia. MPC&A officials say that they will have completed work at 100 nuclear facilities in the near future.[53] Unlike the CTR program, the MPC&A program focuses on both civilian and military nuclear facilities, though the MPC&A program is designed only to secure weapons grade materials.

The MPC&A program, however, has some flaws. Since no one knows exactly how much nuclear material in FSU nations must be guarded, no one knows how much material remains unaccounted. Since no physical inventory has ever been completed at any of the Russian nuclear facilities that contain tons of highly enriched uranium or plutonium, there is no realistic possibility of a comprehensive inventory being completed in the foreseeable future.[54] Even though security has been improved at 62 nuclear facilities, DOE analysts suggest that there may be as many as 150 additional nuclear sites that contain fissile materials.[55] Despite its successes, many in the United States assert that the MPC&A program is a waste of money that allows Russia to use American money on security while continuing to improve its nuclear weapons.

For MPC&A to be more effective, it must expand the scope of its security efforts. All nuclear materials, not just weapons grade uranium and plutonium, must be secure. The United States must ensure that there is adequate protection at all nuclear facilities throughout the FSU. The Congressional Budget Office estimates that outfitting a nuclear facility in the FSU with adequate protection and inventory systems costs ten million dollars. Even if it cost one billion dollars over ten years to ensure that every nuclear

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[53] "Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament." [report on-line]; available from http://www.cbo.gov.

[54] Prepared remarks of William Potter, given at the 7th Carnegie International Non-Proliferation Conference. Washington, D.C., 11-12 January 1999 [speech on-line]; available from http://www.ceip.org/programs/npp/potter.htm.

[55] "Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament."

facility in the FSU has adequate security, the price would be far less than the cost of a single terrorist attack with nuclear materials against the United States.

B. ASSIST NUCLEAR SCIENTISTS

Even if a terrorist group could acquire the materials necessary for a nuclear or radiological weapon, it would still need to have people who knew how to handle the nuclear materials safely. As a result of the breakup of the Soviet Union, there are thousands of nuclear scientists, some of whom were employed to construct nuclear weapons, who were unemployed or underemployed. If the United States could deny terrorist groups the services of these highly trained personnel, the threat of a terrorist group using nuclear materials in an attack against the United States would be reduced.

The quality of life for nuclear scientists in the FSU is therefore a concern for the United States. If these scientists can be employed in a peaceful nuclear program, there is a reduced chance that they would work for a terrorist organization. Desperate people are, however, ingenious in overcoming obstacles. Whatever technologies are deployed, significant proliferation risks will continue to exist if the personnel who must guard and manage nuclear weapons and fissile materials are underemployed, ill-paid, embedded in a culture of growing crime and corruption, and confronted with an uncertain future offering no assurance that they will be able to provide the necessities of life for themselves and their families.[56] Keeping nuclear scientists gainfully employed throughout the FSU will help to ensure that terrorist groups cannot use these scientists' knowledge to conduct a nuclear or radiological attack.

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[56] John P. Holdren and Matthew Bunn, "Reducing the Threat of Nuclear Theft," in *The Road to Zero*, ed. Joseph Rotlab (Boulder, CO: Westview Press, 1998), 142.

There is evidence that terrorist groups have already attempted to recruit Russian nuclear scientists to aid in acquiring nuclear weapons. Aum Shinrikyo had three Russian nuclear scientists working as part of the cult and had attempted to purchase nuclear materials and tactical nuclear weapons.[57] Usama bin Laden may also be using Russian nuclear scientists to build nuclear weapons. According to the journal *Al-Watan al-Arabi* "bin Laden, at his secret base in Khost, is preparing a nuclear complex and is hiring ... hundreds of nuclear scientists from the ex-Soviet republics. This is not difficult as he is offering $2,000 per month salary, compared to the pittance $100-$200 monthly wages they receive in Russia, often not paid for six months at a time."[58] Iran, a state that sponsors terrorism, also may be offering similar salaries to nuclear scientists from the FSU.[59] If these reports are true and ex-Soviet scientists are offering their services to terrorist groups, it is important that the United States find a way to keep these scientists working on peaceful projects at facilities in the FSU.

1. International Science and Technology Center

The International Science and Technology Center (ISTC) was established by the United States, the European Union, and Japan to underwrite civilian research by Russian scientists who formerly worked on the development of WMD. The ISTC centers, located in Moscow and Kiev, were formed to prevent the proliferation of the knowledge and technology of WMD. In particular, the ISTC was tasked with heading off the "brain

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[57] U.S. Congress, House of Representatives, *Nuclear Terrorism and Countermeasures*, 30.
[58] Torabi, "Bin Laden's Nuclear Weapons."
[59] "The Russian Bazaar," *Jane's World Insurgency and Terrorism*, no. 5, 21 May 1999[journal on-line]; available from http://www.janesonline.com.

drain" of weapons scientists.[60] Initiated in 1994, the ISTC originally was part of the DOD's CTR, but shifted to the State Department in 1996.

The ISTC has had some successes in its six years of existence. At the end of 1999, over 17,800 scientists at over 400 institutes throughout the former Soviet Union were either employed or had research funded by the ISTC.[61] The ISTC has been responsible for 785 projects totaling $216.7 million in nuclear-related research.[62] Clearly, the ISTC has played an important role in keeping some of Russia's nuclear scientists employed, but many critics argue that the ISTC efforts are not enough to ensure that nuclear scientists do not find their way to terrorist groups or rogue states desiring nuclear weapons.

Russia had ten secret nuclear cities that were responsible for constructing and maintaining the Soviet Union's nuclear weapons. The ISTC has focused on the roughly 130,000 scientists and other workers that were employed in these cities, but these scientists are not the only ones that present a threat of "brain drain" to terrorist organizations. Russia also has 29 civilian nuclear power plants grouped in nine locations and other nuclear research facilities that have scientists with nuclear expertise.[63] The economic troubles that have plagued Russia in the past decade also have affected those involved in Russia's nuclear industry. While these scientists were not employed in

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[60] Victor Alessi and Ronald Lehman III, "Science in the Pursuit of Peace: The Success and Future of the ISTC," *Arms Control Today,* June/July 1998. [journal on-line]; available from http://www.armscontrol.org/ACT/junjul98/vicjj98.htm.

[61] "Accomplishments in 1999," [report on-line]; available from http://www.istc.ru/istc/website.nsf/ html/99/english/index.htm.

[62] "Total ISTC Project Funding 1994-1999," [report on-line]; available from http://www.istc.ru/istc/website.nsf/ html/99/english/index.htm.

[63] "Russian Federation Nuclear Power Reactors," in International Atomic Energy Agency website [report on-line]; available from http://www.iaea.org/ programmes/a2/index.html

making nuclear weapons in a secret nuclear city, they could nonetheless help to develop a nuclear or radiological weapon for a terrorist group.

The State Department allocates roughly seven million dollars a year to the ISTC. Considering the positive effect this program could have in combating "brain drain" and proliferation, the United States might be well advised to spend more. The 17,800 scientists covered under the ISTC are only about 14% of the 130,000 people who worked (or still work) in Russia's nuclear cities.[64] Even though not all of those that were employed at Russia's nuclear cities were scientists that had knowledge of how to handle nuclear materials, undoubtedly there are many scientists that are not employed under the ISTC that do have this knowledge. If the harsh economic predictions for Russia come true, many more desperate scientists in Russia might be lured into working for a terrorist group. The United States must ensure that all nuclear scientists find ways to support themselves in Russia before they are tempted to assist a terrorist group that is seeking radiological or nuclear weapons.

2. Initiatives for Proliferation Protection

The Initiatives for Proliferation Protection (IPP) program also is designed to employ Russian scientists in peaceful ventures. Under DOE oversight, the IPP teams scientists from the United States and the FSU for joint research projects. The 413 projects the IPP funds at 170 institutes cost about $30 million each year and employ

[64] "Accomplishments in 1999," and Matthew Bunn, et al, "Retooling Russia's Nuclear Cities," *The Bulletin of the Atomic Scientists* 54, no.5, (September/October 1998) [journal on-line]; available from http://www.bullatomsci.org/issues/1998/so98/so98bunn.html.

1,700 scientists in Russia.[65] The focus of the IPP is to convert nuclear, biological, chemical, and defense industries into firms that have commercial applications.

The IPP has some questionable effects as a program to fight against "brain drain." Only about 37 percent of the IPP's budget goes to FSU institutes, and the rest stays in the United States.[66] In addition, only a portion of the funds that make it to Russia is received by the scientists, much of that funding is spent on administrative costs and taxes paid to the Russian government.[67] As result of these financial allocations, the IPP's impact on stemming "brain drain" is questionable. Of the 413 projects the IPP has funded, only two have achieved self-sustaining status. The remainder of the projects have either failed or continue to rely on outside funding to survive.[68] If the United States could improve this program so that more of Russia's nuclear scientists could work on projects that become self-sustaining, the cost of the program to the United States would decrease and fewer Russian scientists might be tempted to work for a terrorist group.

The U.S. General Accounting Office reports suggest that the IPP has not had a large positive impact in keeping Russian scientists employed in peaceful ventures. According to the GAO, the IPP is inefficient and only funds the work of a small percentage of Russia's nuclear scientists. If this is in fact the case, the money the United States spends on this project could be put to better use in a more efficient project like the ISTC, which helps a greater number of nuclear scientists. The United States must ensure

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[65] U.S. General Accounting Office, Resources, Community, and Economic Development Division, *Nuclear Proliferation: Concerns with DOE's Efforts to Reduce the Risks Posed by Russia's Unemployed Nuclear Scientists,* (February 1999) GAO/RCED-99-54, 19.
[66] Ibid., 27.
[67] Ibid., 31.
[68] Ibid., 20.

that as many Russian nuclear scientists as possible are employed to keep these scientists away from terrorist groups that seek radiological or nuclear weapons.

3. Nuclear Cities Initiative

The Nuclear Cities Initiative (NCI) is a joint United States-Russia program that is designed to stabilize Russia's ten nuclear cities and to reduce the incentives for weapons scientists and other nuclear workers to take their skills elsewhere.[69] The NCI was initiated in 1998 after the United States realized that previous attempts to employ Russia's nuclear scientists were not adequate. Even with efforts such as the ISTC and the IPP, Russia still plans to lay off 50,000 scientists that have been working on its nuclear program.[70] An effort to keep at least some of these scientists employed, the NCI is designed to develop commercial enterprises for the residents of Russia's nuclear cities.

The NCI should be an improvement over the IPP because it focuses only on Russia's nuclear scientists. Since it is a government-to-government program, Russian nuclear facilities should not have the tax problems involved with the IPP. The goal of the NCI is better focused than that of either the ISTC or the IPP because the NCI's sole purpose is employing the nuclear scientists at Russia's nuclear cities. The United States has not yet determined exactly how it will implement the NCI. Several options are under consideration, ranging from simply paying the salaries of approximately 20,000 nuclear scientists to using those scientists to assist in research projects.

Since the NCI is a new project that is only beginning to be implemented, there is no data on its successes or failures. One area of concern is whether Russia can deliver a

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[69] "Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament."

[70] "Tauscher, Just Back From Russia, Inspection of Nuclear Cities Initiative, Voices Concern Over Reaction to GAO Report." [report on-line]; available from http://www.house.gov/tauscher/2-22-99.htm.

promised $30 million for the NCI. Another concern is the cost of the project, if the United States were to create all 50,000 jobs to compensate for the anticipated lay offs the total cost would be $550 million.[71] Due to the current state of Russia's economic system, there can be no guarantee that Russia will be able to support any portion of the NCI; this is a problem the United States must be prepared to face. By initiating the NCI, the United States has shown that it has an appreciation for the magnitude of the problem that Russian "brain drain" presents.

C. INTERDICT SMUGGLING ROUTES

In addition to the problems Russia and other FSU nations pose for nuclear materials security, they also lack the capability to detect the smuggling of nuclear materials across their borders. The head of the Russian Customs section responsible for interdicting nuclear materials, Nikolai Kravchenkyo, admitted that "people who want to smuggle radioactive material can do so with little risk by simply substituting or increasing the material recorded on the export license or customs declaration, and customs officials have no way of knowing what is really inside the containers."[72] In view of the many examples of nuclear materials from FSU countries confiscated in Europe and South Asia, Mr. Kravchenkyo's words ring true.

Shortly after the fall of the Soviet Union, law enforcement agents throughout Europe uncovered many nuclear smuggling cases. Between 1991 and 1994 the number of nuclear smuggling cases in Germany increased from 41 to 267.[73] In the first half of the 1990s, almost all of the smuggling cases involving nuclear materials from the former

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[71] U.S. General Accounting Office, *Nuclear Proliferation Concerns,* 57.
[72] Lee, "Smuggling Update," 14.
[73] James L. Ford, "Nuclear Smuggling: How Serious a Threat?" *National Defense University Strategic Forum* 59, January 1996 [journal on-line]; available from http://www.ndu.edu/inss/strforum/ forum59.html.

Soviet Union were discovered in Eastern and Central Europe. By 1996, German officials reported that trafficking incidents had declined by more than half.[74] However, recent reports indicate that nuclear smuggling incidents actually might not have declined in the latter half of the 1990s. Rather, smugglers may have shifted their transport routes from Eastern Europe to the less protected borders of FSU countries.

Nuclear smuggling incidents have, for example, increased through Russia's southern borders in recent years. Between 1995 and 1999 there were twelve reported incidents of nuclear smuggling involving Turkey.[75] Two important observations can be made regarding the Turkish-related smuggling trend. First, all the nuclear materials originated in countries of the former Soviet Union. Second, the sheer number of cases indicates that Turkey may be a significant transshipment route for clandestine efforts to buy or sell nuclear materials originating in the former Soviet Union.[76] Thirteen of the sixteen seizures of nuclear materials reported in 2000 took place either in Russia or in countries south of Russia.[77]

Nuclear materials are easier to smuggle through Russia's southern borders, because these borders are not as well guarded as those leading to Europe. No radiation monitoring equipment has been deployed along Russia's borders with Georgia, Azerbaijan, and the Central Asian states. Moreover, these countries lack the proper equipment to detect nuclear contraband.[78] In an effort to deal with this problem, the United States has instituted the Second Line of Defense (SLD) program.

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[74] Lee, "Smuggling Update," 12.
[75] Sandi Arnold and Michael Barletta, "Overview of Reported Nuclear Trafficking Incidents Involving Turkey 1993-1999. [report on-line]; available from http://www.miis.edu/research/wmd/flow/turkey/index.htm.
[76] Ibid.
[77] U.S. Department of Energy, *Illicit Trafficking of Nuclear Materials*, 8.
[78] Phil Williams, *Organized Crime: The New Threat?* (London: Frank Cass LTD, 1997), 115.

The SLD program is designed to assist Russia in preventing the smuggling of nuclear materials and nuclear weapons at its borders, either by land, sea or air.[79] The SLD program accomplishes this goal by helping to train and equip Russia's customs service and border police officers so they can detect nuclear smuggling.[80] The program has two initial goals. First, it seeks to procure Russian-manufactured radiation detection equipment to be used at customs sites. DOE hopes that purchasing equipment for Russia will quickly reduce the vulnerability of Russia's weakest customs sites. Second, the SLD strategy is to develop training programs for Russian customs officials.[81]

Like the other programs discussed in this chapter, the SLD program faces an uphill battle due to the enormous task of improving Russia's customs enforcement. On 2 September 1998 the first equipment of the SLD program was installed at Moscow's Sheremetyevo-1 international airport. Additional monitoring stations were installed the next month at the Caspian Seaport of Astrakhan and are scheduled for other Moscow airports.[82] These initial efforts, however, only begin to scratch the surface of the nuclear smuggling problem. Russia has nearly 500 border checkpoint locations spread across thousands of miles, to say nothing of the feasibility of illegal border crossings. If monitoring equipment was installed at only fifteen high priority locations, the cost would be about $70 million.[83]

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[79] Deborah Yarsike Ball, "The U.S. Second Line of Defense: Preventing Nuclear Smuggling Across Russia's Borders," [report on-line]; available from http://www.fas.harvard.edu/ponars/policy%20memos/ball50.html.
[80] "Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament."
[81] Ball, "The U.S. Second Line of Defense."
[82] U.S. Department of Energy. "Richardson, Russian Federation Dedicate Second Line of Defense," [report on-line]; available from http://www.doe.gov/news/releases98/seppr/pr98112.htm.
[83] "Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament."

The United States must continue its efforts to stop terrorist groups from acquiring nuclear materials. If nuclear materials are harder to obtain, the threat of a terrorist group acquiring a nuclear or radiological weapon will be reduced. The United States has invested in a number of programs designed to secure nuclear materials and employ nuclear scientists throughout the FSU. Unfortunately, the size of the Soviet nuclear program and the current state of national economies throughout the FSU make the job of securing all the nuclear materials and employing all the nuclear scientists extremely difficult. In addition, the United States has recognized that even with the efforts to secure nuclear materials there could still be some attempts to smuggle nuclear material out of Russia; so it has initiated the SLD program. Most of these programs focus only on one aspect of the nuclear programs in the former Soviet Union, nuclear weapons. For the United States to reduce the threat of a terrorist group gaining possession of a nuclear or radiological weapon, it should ensure that as many sources of radioactive material and nuclear scientists as possible are properly safeguarded against diversion to a terrorist group.

IV. DETERRENCE

The United States used deterrence as the basis of its defense strategy against the Soviet Union during the Cold War. Today many debate whether deterrence can be effective against terrorist groups. The participants in *Wild Atom* recognized this problem, asking "how does one deter a terrorist group bent upon a catharsis of violence-- one without territory or a population at risk?"[84] This chapter investigates this question by evaluating deterrence from two perspectives. First, it explores how the United States can apply deterrence in the classic sense of protecting itself by communicating the credible threat of unacceptable retribution should the enemy decide to launch an attack. Second, this chapter explores the possibility of employing deterrence strategies other than the threat of massive retaliation to influence the actions of terrorists.

A. CLASSIC PUNITIVE DETERRENCE

Proponents of deterrence still advocate relying on threats of punishment as a defense against aggression. In 1997, the then-Commander in Chief of the U.S. Strategic Command (STRATCOM), General Eugene B. Habiger, noted that deterrence still rests on three perceptions; that aggression poses unacceptable risks, that no potential adversary will have the opportunity to inflict a disarming strike, and that any potential adversary will face an assured, significant, and credible retaliatory capability.[85] Punitive deterrence could hypothetically be used to stop nuclear or radiological terrorism by targeting either the terrorists themselves or by targeting the states that sponsor terrorism. By targeting each of these components of terrorism, the United States will have a better chance to alter terrorist intentions to use nuclear or radiological weapons against U.S interests.

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[84] CSIS Global Organized Crime Project, *Wild Atom,* xv.

1. Classic Deterrence Targeting Terrorist Groups

The United States has proven its willingness to use classic deterrence against terrorists, both in declaratory policy and in conducting military operations. The first element of United States terrorism policy is to make no concessions to terrorists and to strike no deals. The second element is to bring terrorists to justice for their crimes.[86] U.S. military doctrine has even indicated that non-state actors (terrorist groups) that possess WMD could be legitimate targets for a nuclear strike.[87] After the 1998 terrorist bombings at the United States embassies in Kenya and Tanzania, the United States retaliated with missile attacks at a chemical facility in Sudan and terrorist training camps in Afghanistan. These declarations and actions suggest that the United States is serious about backing up its strong talk with tough actions against terrorists.

Some experts believe that the United States policy may not be enough to deter terrorists possessing nuclear or radiological weapons. The participants in the CSIS *Wild Atom* study recommended that the United States adopt a more aggressive counter-terrorism policy by declaring that any entity possessing non-safeguarded nuclear material must immediately give it up or be considered fair game for United States pre-emptive action.[88] Using the threat of punishment, either in a pre-emptive or retaliatory strike, as a deterrent requires that the adversary believe that the United States is capable of and willing to launch a military strike. While the 1998 missile attacks against the chemical facility and terrorist training camps exemplify American *intent* to punish terrorists for

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[85] General Eugene B. Habiger, "Deterrence in a New Security Environment," *Strategic Forum* 109, April 1997 [journal on-line]; available from http://www.ndu.edu/inss/ strforum/forum109.html.
[86] U.S. Department of State, *Patterns of Global Terrorism 1999.*
[87] Joint Pub 3-12.1. "Doctrine for Joint Theater Nuclear Operations." 9 February 1996, III-7.
[88] CSIS Global Organized Crime Project, *Wild Atom,* 49.

their crimes, at times the United States may not have the *capability* to retaliate against terrorism.

The United States still has not been able to determine the identity of the terrorists responsible for the 1996 bombing of the Khobar Towers in Saudi Arabia. Usama bin Laden has been on the FBI's most wanted list for years but he still remains at large. Moreover, there has been debate about whether the chemical facility at Khartoum was actually used to make chemical weapons. For punitive deterrence to be effective against terrorists, the terrorists must believe they will not be able to get away with an attack. In order to threaten terrorists with retaliatory punishment, the United States must first know who to hold responsible for an attack.

Deterrence poses a special challenge when countering a terrorist threat. Retaliation requires knowledge of who has launched an attack and where to find them. Those requirements are not a problem when the threat comes from a government, but they are a problem if the enemy is anonymous, like most terrorists.[89] Any terrorist group competent enough to carry out a nuclear or radiological attack against the United States is probably intelligent enough to understand that doing so would bring the full weight of the world's only superpower down upon it, assuming of course that the United States learns the identity and location of the attacker. This suggests that if deterrence fails, it is likely to have failed not because the attacker underestimated the cost of conducting the

[89] Richard K. Betts, "The New Threat of Mass Destruction," *Foreign Affairs* (January-February 1998): 34.

attack, because it: (a) believed it could escape detection; (b) believed alternative courses of action were worse; or (c) for reasons of fanatical motivation or dementia did not care about the prospect of punishment.[90]

Relying upon threats of punishment as a deterrent against terrorist groups presents a number of possible problems. Threatening to punish terrorists for their attacks is plausible only if the terrorists believe that they will be identified, but identification has proven to be difficult for the United States. Using deterrence as a strategy also may hamper other counter-terrorist efforts. By declaring that it will strike no deals with terrorists, the United States is sending the message to terrorists that, if caught, there is no chance the terrorists can decrease the severity of their punishment in exchange for offering information. While this may provide some benefits as a deterrent to terrorists, it also may hamper intelligence efforts that could gain insight into terrorist organizations, prevent future terrorist attacks, or lead to the arrest of more dangerous terrorist leaders. To use punishment as an effective deterrent against terrorists, the United States must improve its capability to back up its declarations with effective actions.

2. Classic Deterrence Against State Sponsors of Terrorism

Another way to use deterrence to protect the United States against nuclear or radiological terrorist attacks is to target the state sponsoring the terrorists that might acquire nuclear or radiological weapons. All terrorist organizations reside in territory claimed by some government. Terrorists may have their own financial assets, weapons, and leadership, but they all operate or are sheltered in territory administered by some government. Threatening governments that sponsor terrorists with retaliatory punishment

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[90] Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America's Achilles' Heel* (Cambridge, MA: MIT Press, 1998), 326.

may be effective in deterring those governments from supporting nuclear or radiological terrorism.

In 1999 the United States redesignated seven states as sponsors of terrorism: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria. Afghanistan and Pakistan are also considered worrisome because they tolerate terrorists living and moving freely within their territory.[91] Chapter II examined the increased potential of state-sponsored terrorists to acquire nuclear or radiological weapons. Especially troublesome are terrorists supported by Cuba, Iran, Iraq, North Korea, Pakistan, and Syria, because these states either have or are suspected of trying to obtain nuclear weapons. States that have the potential to produce nuclear or radiological weapons and that support terrorism could provide terrorists with assistance in carrying out a nuclear or radiological attack against the United States. Punitive deterrence directed at these states may help the United States convince these states not to sponsor nuclear or radiological terrorism.

States are better targets for punitive deterrence because the United States can more easily target the leaders and assets of countries. The central target of deterrence is the political leadership of an opposing nation, because that is where the ultimate decision to use military force may be made.[92] Not all states that sponsor terrorism, however, actually direct the actions of the terrorists. If the United States could affect the decision making processes of the countries that directly control and sponsor terrorism, it could indirectly frustrate the ambitions of terrorists that may desire to conduct a nuclear or radiological attack.

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[91] U.S. Department of State, *Patterns of Global Terrorism 1999.*
[92] Joint Pub 3-12. "Doctrine for Joint Nuclear Operations." 15 December 1995, I-2.

A country that sponsors terrorism could be directly or indirectly responsible for assisting a terrorist who might conduct a nuclear or radiological attack against the United States. A state could be held directly responsible for a nuclear or radiological terrorist attack if that state actually provided the nuclear or radiological weapons to the terrorists and directed an attack. By contrast, a state could be indirectly responsible for a nuclear or radiological terrorist attack if it only provided general assistance to the terrorist group without actually directing or even having knowledge of the nuclear or radiological attack. Chapter II identified terrorists that could potentially carry out nuclear or radiological attacks without any direct assistance from a state sponsor. Though this distinction could be difficult to discern, it is important because it affects the way punitive deterrence could be used in each situation.

The United States should make it clear that a state that directly assists terrorists conducting a nuclear or radiological attack against the United States will be held just as responsible for the attack as if that state's military forces had conducted the attack. When using punitive deterrence against states, the United States faces a problem distinct from attempting to coerce terrorist groups. The difficulty in coercing states is not a question of capability but rather of credibility. No one can argue about the United States ability to conduct a strike against a foreign government. There may be some doubt, however, as to whether the United States would conduct a strike against the leadership of a government that may have sponsored nuclear or radiological terrorism.

Joint Pub 3-12.1 lists WMD and their delivery systems, as well as associated command and control, production, and logical support units as possible targets for U.S.

nuclear strikes.[93] If one accepts the proposition that terrorist forces directed by a state could be considered equivalent to military forces, the facilities of the state that sponsors nuclear or radiological terrorism are legitimate targets for retaliation. (U.S. retaliation would not, however, necessarily include the use of nuclear weapons. The United States has many non-nuclear means of retaliation and multiple incentives to avoid operational employment of nuclear weapons.) Classic deterrence only works if foreign governments understand and believe that the United States will hold states that sponsor terrorism responsible for the consequences of the terrorist attacks they direct. Ensuring that states understand how the United States views direct sponsorship of terrorism could become important during a crisis or hostilities between the United States and one of these governments.

States that have terrorists armed with nuclear or radiological weapons under them may believe these assets form the basis of an asymmetric strategy to offset the military superiority of the United States. To prevent United States intervention in some future conflict, adversaries may apply asymmetric challenges in peacetime, in a crisis, and very early in a conflict. Such challenges would attack United States willpower or disrupt United States planning, causing a strategic pause. A terrorist attack might force the United States to disengage in a regional conflict.[94] A state could use terrorists to deliver radiological devices covertly, minimizing the risk of United States intervention or retaliation. Whether a state would choose to utilize such a capability is another question, but it is not inconceivable.[95]

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[93] Joint Pub 3-12.1, III-6.
[94] Bruce W. Bennett, Christopher P. Twomey, and Gregory F. Treverton. *What Are Asymmetric Strategies?* (Santa Monica, CA: Rand, 1999), 6.
[95] Cameron, *Nuclear Terrorism: A Threat Assessment for the 21st Century*, 11.

The United States must be aware of the threat posed by states that may possess nuclear or radiological weapons and sponsor terrorism, especially if the United States gets involved in a military conflict with one of these states or their allies. The United States should have a clear, credible policy to use as a deterrent against these governments. Not all states that sponsor terrorism, however, actually direct the actions of the terrorists they support. In these cases, the threat of unacceptable retaliation may not be credible, because the United States could face a great deal of political hostility from other nations if it executed retaliatory strikes in ambiguous circumstances. This is especially important since the United States now rarely conducts coercive actions without the support of allies. Governments that indirectly support terrorism can still be deterred, though the threat of massive retaliation may not be the most effective option for influencing those governments.

B. MODIFIED DETERRENCE

Deterring terrorists or the states that sponsor terrorism may require more than just the threat of military retaliation that would cause massive and presumably unacceptable damage. Punitive deterrence threats may work against strong countries like Russia and China that are easy to target and have a capability to use military forces to attack the United States. None of the states that sponsor terrorism or the terrorists have the capability to engage the United States successfully in conventional combat, which is a reason they resort to terrorism in the first place. Still, the United States must be able to affect the decisions of terrorists or the states that sponsor them, especially when the possibility that nuclear or radiological weapons may be involved in terrorist attacks.

Classic punitive deterrence alone may not offer the best protection from nuclear or radiological terrorism.

Successful deterrence requires coercive power. Power represents the ability to achieve a desired outcome. Coercive power represents the ability to achieve a desired outcome by influencing another actor's behavior.[96] Deterrence then can be thought of as the ability to influence behavior, which for the purposes of this thesis is the behavior of terrorists desiring to use nuclear or radiological weapons. If the United States can influence the behavior of terrorists without resorting solely to the threat of punitive retaliation, the United States can improve its ability to deter terrorists from using nuclear or radiological weapons in an attack against the United States. To deter terrorists and terrorism-sponsoring states, the United States should design and implement a new deterrent strategy that is guided by several interrelated principles: maintaining a balanced perspective on punitive deterrence's contributions, moving beyond the threat of punitive retaliation alone to create incentives for restraint, and demonstrating resolve through peacetime actions.[97]

The United States has a number of options available to use modified deterrence against nuclear or radiological terrorism. If the United States could improve its domestic defenses against nuclear and radiological attacks, terrorists might decide an attack with these weapons would be too difficult and not worth the risk. The other aspect of covert NBC deterrence that needs improvement falls into the category of deterrence by denial. The United States is vulnerable to covert NBC attacks, due to the difficulty of detecting

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[96] Edward Rhodes, *Power and Madness* (New York: Columbia University Press, 1989), 82.
[97] Paul I. Bernstein and Lewis A. Dunn, "Adapting Deterrence to the WMD Threat." in *Countering the Proliferation of Weapons of Mass Destruction,* eds. Peter L. Hays, Vincent J. Jodoin, and Alan R. Van Tassel (New York: McGraw Hill, 1998), 151.

preparations for these attacks in the first place and to its limited ability to mitigate the consequences of such attacks.[98] The simplest mode of coercion involves threats by the coercer directly related to the end sought by the opponent. An opponent may be deterred from undertaking some action because of the coercer's credible commitment directly to prevent him from achieving, without unacceptable difficulty, the goal that motivated that particular action.[99]

To illustrate the point, if someone did not want to have his house broken into, he could adopt a punitive deterrent strategy and ensure that everyone knows that the owner of the house owns a gun and will shoot any trespassers on sight. Rational actors would then presumably not attempt to break into the house for fear of suffering unacceptable damage. Alternatively, the owner of the house could adopt a modified deterrent strategy and make it impossible to break into the house by erecting a large fence, surrounding the house with motion detectors, and placing alarms at every entrance to the house. Now rational actors would presumably not attempt to break into the house because they know they cannot do so without being caught. Either way, the owner of the house is influencing the decisions of would-be burglars, thus deterring them from breaking into the house.

The United States has several options to deter would-be nuclear or radiological terrorists. The United States, for example, could increase the rewards for surrendering fissile material or providing information on undeclared stocks or nuclear smuggling.[100] The United States could push to make prohibited weapons development a universal crime, opening the way to prosecution and extradition of individual offenders wherever

[98] Falkenrath, Newman, and Thayer, 327.
[99] Rhodes, 91.

they might be found. This idea utilizes the power of criminal law against individuals, not the power of international law against governments.[101] Since nuclear and radiological weapons are difficult to produce, the United States could expand nuclear material smuggling laws to include not only those individuals found in possession of nuclear materials, but also those responsible for conveying the nuclear materials to the terrorists.

In essence, any action the United States takes that makes it more difficult for terrorists to use nuclear or radiological weapons may have an indirect positive effect on deterrence. Nuclear and radiological weapons would be relatively difficult to acquire. Using these types of weapons in an attack would be expensive and require a great deal of planning. Therefore it is logical to assume that any terrorists attempting to use nuclear or radiological weapons would do so with a high amount of confidence the attack would be successful. If the United States could improve its capability to infiltrate terrorist organizations and disrupt plans for a nuclear or radiological attack or improve defensive capabilities so as to increase to odds of capturing terrorists before they could detonate a nuclear or radiological weapon, some terrorists that might be inclined to seek these weapons could be deterred, in view of the great risk of failure.

C. RECOMMENDATIONS

The United States can deter terrorists from using nuclear or radiological weapons in an attack against the United States. The United States, however, cannot rely solely on punitive retaliation to deter terrorists or the states that may sponsor them. The United States must instead adopt a new strategy of deterrence, a strategy that combines classic punitive deterrence with modified deterrence concepts. By using both types of

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[100] CSIS Global Organized Crime Project, *Wild Atom,* 49.
[101] Carter, Deutch, and Zelikow, "Catastrophic Terrorism."

deterrence, the United States may be able to influence the desires and capabilities of terrorists to use nuclear or radiological weapons so that fewer terrorists will attempt to use them in attacks against the United States.

Current United States military doctrine states that terrorists that acquire WMD or the states that sponsor them are legitimate targets for a pre-emptive strike, possibly even with nuclear weapons: "Operations must be planned and executed to destroy enemy WMD and their delivery systems and supporting infrastructure before they can strike friendly forces."[102] Whether the United States would actually strike terrorists or terrorism-sponsoring states with nuclear weapons is highly debatable; this uncertainty may actually work against deterrence. Some analysts have argued that the United States should outline a policy indicating that both nuclear and conventional retaliation could be considered in response to a terrorist attack with nuclear or radiological weapons. According to David Gompert, Kenneth Watman, and Dean Wilkening of the RAND Corporation "conventional and nuclear retaliatory threats have complementary strengths and weaknesses, the combination of the two may be enough to persuade the adversary that using nuclear or radiological weapons definitely *will* produce a bad result, and *might* produce a horrendous result."[103] Combining the threat of nuclear and conventional retaliation increases the deterrent effects because the combination communicates the fact the United States has the option of choosing responses ranging from massive to precision destruction.

The United States should focus more on developing and improving modified deterrent strategies other than punitive deterrence. Among potential adversaries, the fear

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[102] Joint Pub 3.12-1, ix.

of a well-armed and resourceful United States may well have accelerated the search for asymmetric strategies. Such strategies seek to put the strengths of the weak against the vulnerabilities of the strong; they threaten to inflict huge casualties on United States power projection forces and American citizens through unconventional attacks with unconventional weapons.[104] The United States does not know what types of terrorists may present the greatest threat of using nuclear or radiological weapons. This uncertainty demands that the United States be able to deter a wide variety of nuclear or radiological terrorist threats. The best deterrence strategy will combine the attributes of punitive and modified deterrence strategies. Any action the United States undertakes that will make it more expensive or more difficult for terrorists to use nuclear or radiological weapons in an attack will increase the ability to deter nuclear or radiological terrorism.

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[103] David Gompert, Kenneth Watman, and Dean Wilkening, "Nuclear First Use Revisited," *Survival* 37, no.3 (Autumn 1995): 36.

[104] Brad Roberts, "Rising Powers: Weapons Proliferation and New Great Powers," quoted in Lt. Col. Lansing E. Dickenson, "The Military Role in Countering Terrorist Use of Weapons of Mass Destruction," [report on-line]; available from http://www.au.af.mil/au/awc/awcgate/cpc-pubs/dickenson.htm.

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V. RESPONSE TO TERRORIST ACQUISITION OR USE OF NUCLEAR OR RADIOLOGICAL WEAPONS

The three strategies to defend against nuclear or radiological terrorism evaluated thus far focus on efforts to deny terrorists the capability or desire to acquire nuclear or radiological weapons. Despite these efforts the United States must be prepared to combat terrorists that have gained possession of nuclear or radiological weapons. Even if faced with the unpleasant scenario of nuclear or radiological weapons in the hands of terrorists, the United States is not powerless in defending itself from an attack. New technologies, nuclear response teams, and effective use of the military could help the United States protect its citizens from nuclear or radiological terrorism. The United States must also become better prepared to cope with the effects of a successful terrorist attack involving nuclear or radiological weapons.

Two steps must occur if the United States is to intercept terrorist nuclear or radiological weapons before they are detonated. First, the United States must determine the exact location of the nuclear or radiological weapons. Second, the United States must dispatch forces to intercept the weapons if they have already been brought into the United States (or assembled in this country) or to destroy the weapons abroad before they can be smuggled into the country or employed. If the United States possessed improved interception capabilities, the chances a terrorist could detonate a nuclear or radiological weapon in the United States would be greatly reduced.

A. NUCLEAR OR RADIOLOGICAL WEAPON INTERCEPTION

The first step in intercepting a nuclear or radiological weapon is determining its exact location. Intelligence efforts will certainly be critical in gaining this information, but the United States cannot expect that the intelligence community will always be able

to determine the precise location information required to intercept terrorist nuclear or radiological weapons. The United States must be able to determine the location of nuclear or radiological weapons without counting on intelligence agencies to be able to offer information leading to the exact location of the weapons.

1. Wide Area Tracking System

Scientists and engineers at the Lawrence Livermore National Laboratory in California have developed a promising new program that is designed to locate nuclear or radiological weapons before they can be used by terrorists. Named the Wide Area Tracking System (WATS), this system can provide the United States with weapons location information that could allow authorities to dispatch emergency response teams or order a military strike to intercept nuclear or radiological weapons before they can reach their intended targets.

WATS couples information obtained from multiple sensor arrays of portable radiation detectors that are strategically placed throughout an area to be protected. WATS uses data-fusion to detect, identify, and track a nuclear or radiological device.[105] An expandable array of unattended sensors (radiation and vehicle detectors) is deployed within the area to be protected. The sensors then relay radiation detection information via standard communications links to a computer located at a central control station. Using data-fusion techniques, information from the sensors is integrated and combined with other available data to detect and track a nuclear or radiological device.[106]

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[105] Lawrence Livermore National Laboratory Nonproliferation, Arms Control, and International Security Directorate. Document number URCL-MI-121428-NAI-14 (April 1997) [report on-line]; available from http://www.llnl.gov/nai.
[106] Ibid.

In essence, WATS uses portable detectors to identify radiation emitted from nuclear or radiological devices. These cadmium-zinc-telluride detectors can separate the gamma and x-ray emissions by fissile materials from normal background radiation. The sensors are small enough to be placed throughout the area to be protected on objects such as streetlights, telephone poles, or buildings. The sensors also can be placed on vehicles, making WATS portable. These sensors then relay this location information in real time to a databank that fuses the location information with other information such as traffic patterns and prior readings (the data-fusion technique). By fusing all this information, WATS operators can determine the nuclear or radiological weapons' movements and can guide response units to intercept the nuclear or radiological weapon.

One of the present drawbacks of WATS is that it can only protect a small area, such as a port facility or an airport. Plans to expand the capability of WATS are progressing. In January 1999, WATS was exercised in a suburban environment where it demonstrated its ability to locate and track a simulated nuclear device throughout a section of Las Vegas. The major limitation of WATS resides in its ability to filter out completely nuclear or radiological weapon radiation from normal background radiation at large distances. Technological advances may produce sensors with increased detection capabilities that could possibly be deployed over a greater area or on aircraft to expand the area protected by WATS.

Another limitation of WATS is the requirement for radiation to be emitted from the weapon. Such radiation can be greatly reduced by simply placing nuclear or radiological weapons in a lead box or in heavy water. There are other techniques, however, such as active particle bombardment with gamma rays and neutrons that could

detect the presence of lead or heavy water shielding. This information could also be fused into the WATS database, at least giving the operator the ability to lead interdiction forces to the shielding components if the nuclear or radiological weapon itself could not be easily identified or located.

2. Response Units

Locating nuclear or radiological weapons is only half of the battle in protecting against a terrorist attack. The United States also must have the ability to intercept and either disable or destroy nuclear or radiological weapons before they can be detonated. The United States has, however, relatively few units that are capable of intercepting nuclear or radiological weapons compared to the number of units capable of responding to the detonation of nuclear or radiological weapons. While several units can bring specialized training and equipment to the scene of a nuclear or radiological attack, only the DOE's Nuclear Emergency Search Teams (NEST), Accident Response Group (ARG), the DOD's Defense Technical Response Group (DTRG), and the U.S. Army's 52nd Ordnance Group have the personnel and equipment to respond to nuclear or radiological weapons before a detonation occurs.

NEST was established in the mid-1970s to protect against the threat of nuclear extortion, which resulted in NEST capabilities that require a relatively large amount of time to deal with possible nuclear or radiological weapons scenarios. Since nuclear or radiological terrorism was not considered a threat at that time, NEST capabilities were developed for large-scale deployments. The NEST process was thorough, but very slow because it was assumed there would be enough time in an extortion crisis to deploy all

NEST assets.[107] Today the threat of nuclear or radiological terrorism is much more acute. Since 1992, NEST capabilities have been altered to meet the new threat. Specifically, NEST capabilities currently focus more on improving efforts to locate, seize, and recover a nuclear or radiological device.[108]

NEST capabilities are made up of several components that include search and identification of nuclear materials, diagnostics and assessment of suspected nuclear devices, and disablement process. NEST personnel and equipment come from an all-volunteer community composed of scientists, engineers, and technicians from the nuclear weapons design laboratories. Operational deployments could be as large as 800 personnel if required.[109] NEST personnel have participated in a number of training exercises, working with DOD emergency response units and other government agencies. The exercises have ranged from interagency meetings to discuss command and control procedures to field training exercises to identify weaknesses and improve response capabilities.

A second DOE response group, the ARG, includes nuclear scientists, specialists, and crisis managers, plus their specialized equipment. The ARG can be dispatched on short notice to recover weapons and handle radioactive materials.[110] Although designed primarily to respond to the detonation of nuclear or radiological weapons, the ARG units have the personnel and equipment necessary to intercept and dispose of a weapon before it can be used in an attack. Like NEST, ARG units are on call twenty-four hours a day and are ready to deploy anywhere in the world. Whereas NEST units are designed to

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[107] U.S. Congress, House of Representatives, *Nuclear Terrorism and Countermeasures*, 63.
[108] Ibid., 9.
[109] Ibid., 63.

locate nuclear or radiological devices, the ARG is designed to provide technical and operational expertise and guidance to other response units in the event of nuclear or radiological incidents.

The ARG consists of a volunteer force of approximately 400 scientific advisors, weapons engineers and technicians, experts in nuclear and high explosives safety, and other personnel required to safely handle nuclear or radiological weapons. The ARG units consist of two custom-designed trucks with trailers that can be loaded into a C-141, C-5 or two C-130 U.S.A.F. aircraft. An ARG advance party can be deployed two hours after initial notification of a nuclear or radiological incident, whereas the remainder of the unit and the required equipment can be deployed in about four hours.[111] Once on scene, the mobile lab can be set up within an hour. It is designed to remain on station for several weeks.[112]

The DOD also maintains two units that could be used to intercept terrorist nuclear or radiological weapons. The first is the Defense Technical Response Group (DTRG), which is part of the U.S. Navy's Explosive Ordnance Disposal Division (EOD). The second unit is the U.S. Army's 52nd Ordnance Group that operates out of Fort Gillem, Georgia. Both the DTRG and the 52nd Ordnance Group specialize in responding to short notice calls to disable nuclear and radiological weapons.

In contrast to the DOE personnel that must deploy mostly from only three areas of the United States (the location of the three nuclear weapons laboratories), the EOD units

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[110] "Briefing, At Hand to Deal With an Underhand Attack." *Jane's Defence Weekly* 26, no.7 (August 14, 1996): 17.

[111] "Accident Response Group Program and Expense." [report on-line]; available from http://www.doeal.gov/erp/Internet/arg.pdf.

[112] Don Johnston, "Field Test a Success for Accident Response Group." [report on-line]; available from http://www.llnl.gov/nai/newsline/articles/7-10-98arg.html.

are located at numerous areas throughout the country. Whereas the personnel who compose NEST and ARG units are volunteers who train as part of a response unit only part time, the members of the DTRG and the 52nd Ordnance Group are constantly training in weapons disposal tasks. NEST and the two DOD units offer the best chance for the United States to intercept and safely dispose of terrorist nuclear or radiological weapons before an attack can be carried out.

Several problems must be addressed to improve response capabilities. Presidential Decision Directive (PDD) 63 designates the Federal Bureau of Investigation (FBI) and the Federal Emergency Management Agency (FEMA) as lead agencies in responding to a nuclear or radiological incident. Neither the DOE or the DOD, the only two agencies in the United States that possess the capability to intercept and disable nuclear or radiological weapons, would be a lead agency in the event of an imminent terrorist nuclear or radiological attack. Before any of the emergency response units could be deployed they would have to be requested from the lead agency, and they would answer to either the FBI or FEMA. This organizational shortcoming could be easily remedied by either designating a different lead federal agency or by outfitting the FBI and FEMA with their own nuclear and radiological response capabilities.

U.S. legislation poses another problem with using the DTRG or the 52nd Ordnance Group to respond to a terrorist threat inside the United States. The law does not allow the use of active duty military personnel in security operations within the United States unless authorized by the President, who would normally seek Congressional approval before deploying troops. This legal question could lead a President to deploy NEST units rather than the DOD units even though the DOD units are better trained and would most

likely arrive on scene faster than their DOE counterparts. The DOD units have trained personnel stationed throughout the country. The DOD units might be closer to the major metropolitan areas that terrorists would target than the DOE units that are located at the nuclear laboratories in Livermore, California and Los Alamos and Albuquerque, New Mexico.

B. NUCLEAR OR RADIOLOGICAL ATTACK RESPONSE

Despite these efforts, the United States must be ready to respond to a successful terrorist attack with nuclear or radiological weapons. The United States has dedicated some resources to this objective, but its preparations still fall woefully short of what would be needed if a terrorist attacked a city with nuclear or radiological weapons. Relatively crude nuclear explosives with a yield of only about 100 tons would be powerful enough to annihilate the United States Capitol building or knock down the World Trade Center towers in New York City.[113] Even the credible threat of a nuclear or radiological attack would quickly overwhelm local and state civilian law enforcement capabilities. In the *Wild Atom* analytical exercise, researchers concluded that traffic leaving Manhattan could reach as much as ninety percent above normal volume, without New York even specifically mentioned as the target of a terrorist attack.[114]

A terrorist attack with nuclear or radiological weapons could prove catastrophic and would require a unified response from various agencies at the federal, state, and local levels.[115] Nuclear weapons could cause much more damage than radiological weapons. A successful attack with radiological weapons, however, could produce thousands of

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[113] Louis Rene Beres, *Terrorism and Global Security: The Nuclear Threat* (Boulder, CO: Westview Press, 1979), 45.
[114] CSIS Global Organized Crime Project, *Wild Atom*, 39.
[115] U.S. Congress, Senate, Committee on the Judiciary, *U.S. Counter-terrorism Policy*, 38.

injured and dead and could require the evacuation of thousands more, not to mention the decontamination and disposal of tons of dirt and structures. By comparison, the Chernobyl nuclear plant explosion, which was almost entirely a radiological disaster, was responsible for an estimated 6,000 deaths and the evacuation of over 100,000 people in an area that was not very densely populated.[116] Medical centers in Kiev and Moscow diagnosed 28 cases of acute radiation poisoning. Similar numbers of casualties could quickly overwhelm even the best medical centers in the United States.

The good news is that the United States possesses the assets to deal with a catastrophic event such as a nuclear or radiological terrorist attack. A covert NBC attack against an American target, however, could easily overwhelm local response capabilities, resulting in avoidable casualties.[117] The community of first responders across the United States is almost totally unprepared to cope with the operational demands of an attack involving a weapon of mass destruction.[118] No cities or states possess units similar to NEST, even though state and local organizations will be the first to respond and thus have the best chance to reduce the effects of an attack. If a terrorist attack with nuclear or radiological weapons were to occur, the first units with the needed specialized training and equipment would not arrive on the scene until hours after the detonation.

The greatest opportunity to limit damage from a covert NBC attack, or prevent it entirely, exists during the first phases of the crisis. It is important that police and fire departments, disaster management agencies, and emergency medical personnel be trained

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[116] David R. Marples, "Chernobyl's Toll After Ten Years: 6,000 and Counting," *Bulletin of the Atomic Scientist* (May/June 1996) [journal on-line]; available from http://www.bullatomicsci.org/issues/1996/mj96/marplesoped.html.
[117] Falkenrath, Newman, and Thayer, 300.
[118] Ibid., 301.

to identify the warning signs of a nuclear incident and to react appropriately.[119] State and local agencies, however, are neither trained nor equipped to handle the mass casualties and general hysteria that could be expected after a terrorist attack with nuclear or radiological weapons.

Because of the lack of resources at the state and local levels, the responsibility to respond to a terrorist attack with nuclear or radiological weapons will fall to the federal government. The United States maintains a number of units that would be called into action in the event of a nuclear or radiological attack. In addition to the DOE and DOD teams, the other agencies include the Air Force Radiation Assessment Team, Navy and Army Radiological Control Teams, and the DOE Atmospheric Release Advisory Laboratory located at Lawrence Livermore National Laboratory. These teams can bring the specially trained personnel and equipment necessary to deal with the medical and environmental effects of nuclear and radiological weapons.

PDD 63 (a Presidential Decision Directive in May 1998) constitutes U.S. response against the potential effects of nuclear or radiological terrorism. PDD 63 was composed to ensure that the United States government could protect the nation's critical infrastructure from international acts that would diminish the abilities of:

- The Federal Government to perform essential national security missions and to ensure the general public health and safety;
- State and local governments to maintain order and deliver minimum essential public services;
- The private sector to ensure the orderly functioning of the economy and the delivery of essential telecommunications, energy, financial, and transportation services.[120]

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[119] Ibid., 303.

[120] "The Clinton Administration's Policy on Critical Infrastructure Protection: Presidential Decision Directive 63." [report on-line]; available from http://www.fas.org/irp/offdocs/paper598.htm.

PDD 63 designated the FBI and FEMA as lead federal agencies for response to a terrorist attack with nuclear or radiological weapons. PDD 63 also designated various federal agencies as lead agencies for specific sectors and functions. The Departments of Commerce, Treasury, Transportation, Justice, Health and Human Services (HHS), Energy, State, Defense and the Environmental Protection Agency (EPA), FBI, FEMA, and CIA are all assigned specific responsibilities. PDD 63 designates the National Coordinator for Security, Infrastructure, Protection, and Counter-terrorism as the person responsible for implementing and coordinating the directive.

While PDD 63 is a step in the right direction, it does not solve the crisis management and response problems the United States would face in a nuclear or radiological attack. PDD 63 only designates responsibility to federal agencies, which might be the last to respond to a nuclear or radiological attack. (In some circumstances, ill-equipped local and state agencies would probably have to take action before the arrival of federal agencies.) The two lead agencies would have to coordinate the efforts of the 45 federal departments and agencies that have counter-terrorism programs, not to mention the state and local agencies that would be involved.[121] Even with PDD 63 twelve federal agencies are responsible for protecting various sectors, raising the risk of confusion and disorganization. In the event of an attack, each of these agencies might take actions that could hinder the efforts of other agencies.

C. RECOMMENDATIONS

The United States has taken steps to protect itself from terrorists armed with

[121] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism.*

nuclear or radiological weapons. The response programs and units in place today, however, offer little chance for the United States to counter terrorists armed with nuclear or radiological weapons. The United States could develop an effective defense against this type of terrorism, but it currently lacks the organization to take advantage of existing assets.

First, the United States should increase research and development investments in programs such as WATS that offer an increased probability of locating nuclear or radiological weapons. Future technological advancements may increase the detection capabilities of these types of systems, increasing the chance that response units can be directed to a nuclear or radiological weapon before an attack occurs. If an improved version of WATS, or a similar system with increased capabilities, could be developed and deployed to every United States border crossing, seaport, airport, and city, and if improved sensors could be deployed on vehicles that could cover a greater area such as aircraft or satellites, there would be a greater opportunity to locate nuclear or radiological weapons before they are detonated. The U.S. priority in responding to nuclear or radiological weapon acquisition should be to find and neutralize the weapon before it can be used in an attack.

Second, the response actions of the United States should be simplified, with guidelines distributed to all city, county, state, and federal agencies that could be involved in nuclear or radiological attack response efforts. PDD 63 should be replaced by a new PDD that designates one lead agency to coordinate response efforts in the event of terrorism involving nuclear or radiological weapons (or chemical or biological

weapons). The FBI and FEMA are effective in their areas of expertise, but they may not be well-suited for responding to a terrorist armed with nuclear or radiological weapons.

The FBI's ability to conduct investigations regarding conventional domestic terrorism is unparalleled in the United States. But it is less clear that the FBI is the appropriate lead agency for conducting investigations of terrorist acts that may have been committed by foreign powers (states or non-state actors), or that involve unconventional weaponry.[122] The 1996 terrorist attack on the Khobar Towers in Saudi Arabia and the recent attack on the *USS Cole* provide evidence of FBI difficulties in investigating terrorist activities overseas. Although the FBI laboratory is the nation's leading institution for criminal forensics, it has not been a major center of expertise on weapons of mass destruction.[123] The FBI is taking steps to improve its WMD investigation capabilities by upgrading the FBI laboratory. The FBI established a HAZMAT Response Unit in 1996, but the nuclear material identification and handling capabilities of the DOE and DOD still remain superior to that of the FBI.

FEMA exists almost entirely as an administrative organization that commands few resources of its own. FEMA is designed primarily to coordinate responses to natural disasters. The large amount of casualties, evacuations, and destruction that could be associated with a nuclear or radiological attack could easily be more than FEMA could handle. In an emergency, FEMA usually concentrates its efforts on ensuring that relief agencies receive the funding and resources required to take care of those affected by the disaster. In most emergencies FEMA handles, there may be a few hundred people directly affected by the disaster; and there is little need to worry about those who were

[122] Falkenrath, Newman, and Thayer, 297.
[123] Ibid., 298.

not injured or left homeless. A terrorist attack could, however, cause several thousand casualties, many of which could not be treated at local hospitals which lack facilities to treat a large number of radiation casualties. There also might be a requirement for a mass evacuation of people out of the radiation danger area, which might involve entire sections of the country.

The U.S. government should develop another PDD that deals directly with responses to terrorist attacks involving WMD. This new PDD should spell out exactly what each agency is responsible for, and the number of federal agencies involved should be kept to a minimum. The *Wild Atom* analytical exercise highlighted two major deficiencies that could be corrected with the adoption of a new PDD. First, the exercise highlighted the lack of a national policy to deal with a nuclear terrorist crisis. PDD 63 designates responsibility for different sectors, but it does not specify how each lead agency will perform its mission. Second, the participants concluded that a single lead agency should be designated for nuclear smuggling and nuclear terrorism. The middle of a crisis involving nuclear or radiological weapons in the hands of terrorists is no time to wonder who is in charge.

A new PDD should spell out clearly what local, state, and federal agencies should do during a crisis involving nuclear or radiological weapons. This plan should be distributed to every law enforcement and emergency response unit in the country. Major cities should develop evacuation plans, such as the hurricane evacuation plans used in the American southeast. Cities should conduct training drills similar to the earthquake drills Tokyo uses to exercise its preparations for the possibility of mass casualties. State agencies should possess trained response teams and equipment ready for rapid

deployment so the second wave of properly equipped and trained personnel can arrive within the first couple of hours after an attack. Federal agencies should know their responsibilities, what resources they will have at their disposal, and who will command them.

Both the Congress and the President should develop this detailed contingency plan so funding and jurisdictional issues can be settled before the plan is distributed. Congress should ensure that funding is made available to local, state, and federal governments and require states to meet preparedness guidelines. In the new PDD, the possible use of active duty and reserve military assets should be included, so the country knows the President may immediately call upon these assets. The President should have this authority before an attack since any ambiguity in the midst of a crisis could cost time and possibly thousands of lives.

Training should be required at all levels, including the heads of the federal agencies responsible for executing the new PDD. Such training does not take place now. Once all the response agencies know exactly what they are supposed to do in case of a terrorist attack with nuclear or radiological weapons, more effective training can take place. Weaknesses and shortages can then be identified and rectified, and over time the ability to respond to terrorists armed with nuclear or radiological weapons will improve.

A new PDD also should designate the Secretary of Defense (SECDEF) as the lead agent in response to terrorists armed with nuclear or radiological weapons. SECDEF is a logical choice for this responsibility for three reasons. First, a civilian fills the National Coordinator position, allowing military operations to remain under civilian control. Second, SECDEF has more experience than other cabinet members in dealing with large

organizations during crises. Third, the DOD already possesses much of the best infrastructure and equipment necessary to respond to the threat of nuclear or radiological terrorism.

In the event of nuclear or radiological attack, the operational command structure would need to direct everything, potentially ranging from CIA covert actions to strikes by bombers and missiles. The command structure must be able to set up interdiction operations involving ground, sea and air forces, and must have the ability to quickly mobilize and move thousands of soldiers and tons of freight. None of these actions can happen quickly unless plans have already been drawn up and units have been designated to carry them out, with repeated training and exercises to create a readiness to bring the plans to life. In this situation, the DOD's capabilities would immediately become paramount.[124]

Once designated, the SECDEF should establish a unified command structure that would integrate all catastrophic terrorism capabilities and conduct detailed planning and exercises with relevant federal, state, and local authorities.[125] The SECDEF should designate the Chief of the National Guard Bureau (NGB) as the military commander responsible for nuclear or radiological terrorism response. The Chief of the NGB commands 461,000 selected and ready reserve personnel, plus 470,000 army and air national guardsmen already stationed throughout all 50 states. In addition to these approximately 900,000 people, the Air National Guard has approximately 1,180 aircraft stationed at 170 installations throughout the nation.[126] SECDEF would also have instant

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[124] Carter. Duetch, and Zelikow, "Catastrophic Terrorism."
[125] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism.*
[126] Data obtained from the Air National Guard website [database on-line]; availablefrom http://www.ngb.dtic.mil.

access to the resources of the active duty military if needed to respond to a nuclear or radiological attack.

The SECDEF also is a logical choice for National Coordinator because of the assets and capabilities of the military. Much of the military is already trained in personal radiation defense and knows how to use radiation detection equipment, and the National Guard and Reserve units could easily receive this training. The military also has medical personnel that have been trained in treating radiation casualties. Many military hospitals are located on bases that can be closed off so casualties could more easily be isolated. A few strategically located military hospitals could be designated radiation treatment centers. Facilities at selected military hospitals could be upgraded so they could treat a larger number of radiation victims.

In addition to having some capabilities for treating the casualties of a nuclear or radiological attack, the military possesses the logistical infrastructure required to transport response personnel to the scene while evacuating others out of harm's way. The military has the trucks, airplanes, and ships that could move thousands of people quickly. The military has people trained in crowd control, law enforcement, and security, which would all be important in augmenting local and state authorities. Moreover, the military has its own intelligence networks that could work with other government intelligence agencies to avert or respond to a nuclear or radiological terrorist attack.

The SECDEF is the only cabinet member that has access to the vast types and numbers of resources required to conduct an adequate response to nuclear or radiological terrorism. Keeping civilian control of military emergency response units is important, and the SECDEF is the only civilian federal agency head (besides the President) that has

control of the assets required to respond to a terrorist attack with nuclear or radiological weapons. A new PDD should designate DOD under SECDEF as the lead agency in nuclear and radiological (or chemical or biological) terrorism response, and the SECDEF should appoint the Chief of the NGB as the military officer responsible for ensuring that the United States maintains adequate nuclear and radiological terrorism response capabilities.

VI. CONCLUSIONS

The United States must improve its capability to defend against terrorists armed with nuclear or radiological weapons. This thesis has examined four commonly recommended strategies for countering terrorists armed with nuclear or radiological weapons; identifying terrorists that pose a genuine risk of acquiring nuclear materials, securing nuclear material and interdicting smuggling, deterrence, and responding to terrorists already in possession of nuclear or radiological weapons. Since the United States has neither a infinite amount of time or money to spend on the problem of nuclear or radiological terrorism, each of these recommended strategies must be evaluated based upon their positive and negative aspects to formulate a plan the United States can quickly and effectively implement.

A. THE THREAT OF TERRORISM IS CHANGING AND THE UNITED STATES MUST BE PREPARED TO COUNTER NUCLEAR AND RADIOLOGICAL TERRORISM

In testimony to the Senate Armed Services Committee, retired U.S. Marine Corps General Anthony Zinni warned that "we will eventually see a weapon of mass destruction used in a terrorist attack" and added that "we had better start thinking about how we're going to be prepared for that, because we're woefully unprepared for that event. And that's inevitable, as this asymmetry continues."[127] United States Secretary of Defense William Cohen offered a similar assessment when interviewed on the television program *Meet the Press*. "The likelihood of an attack on American soil, using either a chemical, biological, or indeed, a nuclear weapon, is quite, not only possible, but probable."[128]

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[127] Zinni quoted in James P. Pinkerton, "We Face War By Terrorism, Ready Or Not," *Long Island Newsday*, 26 October 2000, 45.
[128] Cohen quoted in Ibid.

The face of terrorism seems to be changing. Recent large-scale terrorist attacks, otherwise known as super-terrorism, exemplify a trend that could lead toward terrorist attacks with nuclear or radiological weapons. Recently terrorists such as Timothy McVeigh have conducted operations that seem to be directed toward causing as many casualties as possible. McVeigh could have destroyed that building in Oklahoma City and still minimized the number of casualties, but he chose to conduct an attack that seems to have been oriented toward maximizing the number of casualties. If maximizing the number of casualties may now be the goal of some terrorists, this desire could lead them to turn to nuclear or radiological weapons.

Another trend that could prove to be dangerous for the United States is the possible breakdown of nuclear materials security in Russia. If economic conditions for the masses remain stagnant, or continue to decline, the questionable state of security throughout Russia's nuclear infrastructure could decline as well. There is already evidence that both terrorists and states that sponsor terrorism are attempting to obtain nuclear materials smuggled from FSU nations. Customs officers in the former Soviet republic of Uzbekistan intercepted ten lead-lined containers filled with enough radioactive materials to make dozens of crude weapons. The materials were apparently being smuggled at the behest of Usama bin Laden.[129] In addition, agents from Iran (a state the United States has designated as a sponsor of terrorism) in Turkey, Kazakhstan, and elsewhere are known to have tried to buy non-fissile but radioactive material originating from the FSU.[130]

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[129] Ibid., 45.
[130] Laqueur, "Postmodern Terrorism," 30.

Only a group of Chechen rebels that was dominated by a charismatic leader, Shamyl Basayev, that almost single-handedly conceived the attack, has used nuclear materials in a terrorist operation. Some dismiss these acts as only evidence that irrational actors do not comply with normal terrorist activity. The casualties and effects resulting from even a single terrorist nuclear or radiological attack, however, could be devastating to the United States. Even if a terrorist attack involving a biological agent, deadly chemicals, or nuclear or radiological materials succeeded only partially, it could profoundly affect the entire nation.[131] While it may be true that only one terrorist group has to date used nuclear materials in an attack, the United States cannot afford to suffer the consequences of even a single nuclear or radiological terrorist attack.

B. THE UNITED STATES MUST PRIORITIZE COUNTER-TERRORISM STRATEGIES TO BE IMPROVED

This thesis has examined four strategies the United States employs to defend against nuclear and radiological terrorism and has provided recommendations on how to improve each strategy. In a perfect world, the United States could promptly improve its counter-terrorism efforts in all areas. An immediate across-the-board defense improvement is not a realistic option, however. The United States must decide what strategies offer the best prospects for defending against nuclear and radiological terrorism and invest more resources to improve those areas.

The highest priority for United States counter-terrorism policy should be to improve intelligence capabilities, especially in human intelligence (HUMINT). Terrorists usually depend on remaining hidden to conceal their planning and actions prior to an attack and to escape capture after an attack. This behavior would be especially

[131] National Commission on Terrorism, *Countering the Changing Threat of International Terrorism.*

probable if terrorists were going to use nuclear or radiological weapons since there would presumably be more time, effort and risk involved to acquire nuclear materials. The best way to protect against terrorist attacks is to penetrate the veil of secrecy that surrounds terrorist organizations and thereby gain access to knowledge of terrorist intentions. Only a small number of terrorists may possess both the desire and capability to acquire nuclear materials, so the intelligence community should focus its efforts against these select few groups to improve detection of a possible nuclear or radiological attack.

The second priority for the United States should be to improve response capabilities against terrorists that have already acquired nuclear or radiological weapons. Despite concerted intelligence, nuclear material security, and deterrence efforts the United States may still face terrorists armed with nuclear or radiological weapons. Specifically, the United States should concentrate on improving interception capabilities and crisis response organization. The United States must improve its capability to disable nuclear or radiological weapons before they are detonated. PDD 63 should be replaced with a new crisis response plan that designates the DOD as the lead agency in a nuclear or radiological attack response.

Implementing improvements in intelligence and response efforts could be relatively inexpensive, and certainly would be less expensive than dealing with the consequences of a nuclear or radiological attack from terrorists. Two of the major improvements are administrative changes that could be accomplished quickly by changing current policy. First, the United States should change its counter-terrorism policy to allow law enforcement and intelligence agents to make deals with terrorists if such deals could lead to the discovery of additional information making possible arrests

of terrorist leaders or stopping future attacks. Second, adopting a new PDD would improve the capabilities of specialized nuclear emergency response units since a wide variety of military assets could quickly be called into action. The extra expenses to improve intelligence and response efforts (in areas such as additional equipment and personnel, research and development, and increased training) would be justified by the improved counter-terrorism capabilities the United States would acquire.

Deterrence and securing nuclear materials should be lower priorities for the United States, though efforts in these areas should not be reduced. The United States already has enough nuclear and conventional military power to practice punitive deterrence against terrorists. Improving intelligence and response capabilities would allow the United States also to improve its modified deterrence capabilities. Securing nuclear materials is obviously important to defend against nuclear or radiological terrorism, but the United States can work in cooperation with other nations to improve security in nuclear facilities throughout the FSU. "Loose nukes" and "brain drain" from Russia are threats to numerous countries, so the United States could seek arrangements to share the cost of programs such as the Material Protection Control & Accounting, International Science and Technology Center, and Second Line of Defense with other governments. Washington could then dedicate funding to other capabilities that the United States must improve on its own.

C. THE UNITED STATES MUST IMPROVE ITS DEFENSE AGAINST NUCLEAR OR RADIOLOGICAL TERRORISM ON AN ACCELERATED BASIS

Some members of the United States Congress have recognized the need to improve counter-terrorism capabilities, but thus far progress has been slow. Senators Jon

Kyl and Dianne Feinstein have sponsored a bill that would require the president to devise a long-term research and development initiative aimed at developing new technologies for countering terrorist attacks involving chemical, biological, and nuclear weapons. The bill also would require the CIA to prepare a report on the advisability of current guidelines restricting the recruitment of terrorist informants.[132] If passed into law, both of these recommendations would enhance America's ability to combat nuclear or radiological terrorism.

The United States faces two limitations in its efforts to protect against terrorists armed with nuclear or radiological weapons. The first limitation is a possible lack of time to prepare for an attack. Terrorists may already possess nuclear or radiological weapons. Focusing improved intelligence capabilities against those terrorists that may attempt to acquire nuclear or radiological weapons could provide a better assessment of the threat.

The second limitation is resources. The United States cannot afford to spend billions of dollars on programs that may not improve capabilities to defend against nuclear or radiological terrorism. The United States should focus resources primarily in the areas that will offer the greatest improvements in defending against terrorists armed with nuclear or radiological weapons. Though better capabilities in any of the four strategies examined in this thesis would enhance counter-terrorism efforts, improved intelligence and response capabilities could offer the most valuable means to strengthen America's defenses against terrorists armed with nuclear or radiological weapons.

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[132] Vernon Loeb, "Senator Presses For Bill To Combat Terrorism," *Washington Post*, 3 October 2000, 23.

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   Offutt AFB, NE 68113-6004

10. CDR Kevin Ferrill, USN.....1
NIWA
4215 Suitland Rd.
Washington, DC 20395-5720

11. LT Jeff Fogarty.....3
RR1 Box 220Q
Mazeppa, MN 55956