



Center for Nonproliferation Studies
Monterey Institute of International Studies

Recommendations on the Development of
Methodologies and Attributes for Assessing Terrorist
Threats of WMD Terrorism

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Center for Nonproliferation Studies

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The WMD Terrorism Research Program conducts work on the use or potential use of chemical, biological, radiological and nuclear (CBRN) weapons by non-state actors. The Program focuses on the motivational aspects of terrorism in the WMD context, bringing together terrorism scholars from the social sciences (history and political science) and technical experts from the sciences (microbiology, medicine, chemistry, and physics) to approach the WMD terrorism problem in an interdisciplinary fashion.

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Chapter 1: Introduction*

During the past two or more decades, there has been a steadily growing concern in both policymaking and academic circles about the threat posed by terrorism involving so-called Weapons of Mass Destruction (WMD). Not surprisingly, this concern became even more acute in the wake of the March 20, 1995 sarin nerve agent attack in the Tokyo subway system by an apocalyptic millenarian religious group known as Aum Shinrikyo (Aum Supreme Truth), an event that has been described as the very “first major sub-state use” of such a weapon.¹ Many experts argued that Aum’s blatant and indeed traumatic violation of long-standing societal taboos against the use of WMD by non-state actors represented a “qualitative leap” that would soon inspire other terrorist groups to employ them, whereas other specialists instead insisted that terrorists were likely to continue to rely on tried-and-true conventional weapons.² In the event, neither of these positions has turned out to be entirely warranted.³ Although no significant spike in actual incidents of WMD terrorism has yet occurred, there are increasing indications that certain types of terrorist groups have been planning to carry out attacks using WMD and, more worrisome still, several apparent plots to launch these types of attacks have recently been interdicted. Given the importance of devising sensible policies and allocating resources effectively in order to forestall or respond properly to such potentially devastating attacks, there is currently a crying need to try and separate fact from fiction by examining, synthesizing, and critically evaluating the existing scholarly and policy-oriented literature dealing with WMD terrorism. The purpose of this report is to begin the process of expanding current understanding by assessing the value of this literature and providing the basis for extracting a comprehensive set of attributes to describe and characterize terrorist threats involving WMD in a more systematic manner. As such it should be viewed mainly as an initial, preliminary phase in a more comprehensive effort to evaluate the nature and extent of the WMD terrorist threat.

Before turning to a summary of the criteria used to collect that literature and its actual analysis, it is first essential to clarify the meaning of fundamental concepts like “terrorism” and “WMD” in an effort to dispel the widespread existing confusion about those terms, which only serves to hamper analytical precision and policy formulation. Far from being a trivial exercise, a number of analytical problems are presented by these concepts, problems that policymakers often skirt nimbly around or exploit in order to support a particular agenda. This inevitably occurs at the expense of an adequate assessment of the potential for WMD terrorism.

* This chapter was written jointly by Jeffrey M. Bale (terrorism, terrorist categories) and Gary Ackerman (WMDs, threat assessment).

¹ Gavin Cameron, *Nuclear Terrorism: A Threat Assessment for the 21st Century* (New York: Macmillan Palgrave, 1999), p. 1. Jean Pascal Zanders echoes this point but also makes an important clarification: the Aum incident was the first time that non-state actors employed an actual chemical warfare (CW) agent, but certainly not the first time they had made use of other types of potentially lethal toxic chemicals. See his “Assessing the Risks of Chemical and Biological Weapons Proliferation to Terrorists,” *Nonproliferation Review* 6:4 (Fall 1999), p. 19.

² See, e.g., Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), pp. 164, 167, 169; and Bruce Hoffman’s segment in “America and the New Terrorism: An Exchange,” *Survival* 42:2 (Summer 2000), p. 163; Brad Roberts, “Has the Taboo Been Broken?,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1997), pp. 121-40.

³ Compare Brian M. Jenkins, “Understanding the Link between Motives and Methods,” in *ibid*, p. 44.

The Distinguishing Characteristics of Terrorism

Prior to identifying which particular groups might have the motivations and/or capabilities to carry out WMD terrorist attacks, it is necessary to make a few introductory remarks about terrorism and the general categories of terrorist groups. Perhaps the first desideratum should be to draw a clear analytical distinction between “terrorism” in the strict sense of the term and other types of non-state violence, a distinction that unfortunately needs to be made at the outset precisely because most definitions of terrorism – including those employed by U.S. government agencies⁴ – are imprecise if not entirely misleading. Without spending too much time on contentious definitional questions, it can be said that the best way to distinguish between terrorism and other forms of violence is to recognize that most acts of violence are dyadic, i.e., they involve only two parties or protagonists, the perpetrator(s) and the victim(s):

Perpetrator → Victim

In marked contrast, bona fide acts of terrorism are triadic, i.e., they involve three parties or protagonists, the perpetrator(s), the victim(s), and a wider target audience (or audiences):

Perpetrator → Victim → Wider Target Audience(s)

In short, terrorism is violence that is consciously carried out by the perpetrator(s) in order to influence the attitudes and behavior of a wider target audience (or multiple target audiences). It is, as Brian Jenkins and others have aptly pointed out, violence for psychological effect.⁵

Indeed, one of the many perverse ironies of terrorism is that, although the actual victims suffer its effects disproportionately and in the most direct and brutal manner, their importance is strictly secondary and derives principally from the fact that they have been specifically selected because they are viewed as symbolizing something larger or representing a broader category of persons.

⁴ Note, e.g., the definition from Title 22 of the U.S. Code, Section 2656f(d): “Terrorism means premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience.” See www.cia.gov/terrorism/faqs.html. Here there is one unnecessary restriction (e.g., terrorism can be “religiously motivated” or even “economically motivated” as well as “politically motivated”) and two outright errors (terrorism is not always perpetrated against “noncombatant targets,” and it is not only carried out by “subnational groups” or “clandestine agents” – the worst perpetrators of terrorism, historically speaking, have been states, who often openly employ their own security forces instead of “clandestine agents”), and the quintessential feature of terrorism – the carrying out of violence in order to influence a wider target audience – is wrongly qualified with “usually.” See note 5 below.

⁵ The best collection and analysis of definitions of terrorism can be found in Alex P. Schmid and Albert J. Jongman, *Political Terrorism: A New Guide to Actors, Authors, Concepts, Data Bases, Theories and Literature* (Amsterdam: North-Holland, 1988), especially pp. 1- 38. Many of the better definitions highlighted therein emphasize the centrality of carrying out violent actions with the conscious intention of exerting a psychological impact on a wider target audience. Although this work is now out-of-date and is crying out for new edition, Jeffrey Bale still regards it as the best single introduction to terrorism. The formal definition that Bale has been using in his own classes on terrorism for several years is as follows: “Terrorism is the use or threatened use of violence, directed against victims selected for their symbolic or representative value, as a means of instilling anxiety in, transmitting one or more messages to, and thereby manipulating the attitudes and behavior of a wider target audience or audiences.”

To put it another way, the most important nexus in any terrorist act is between the perpetrators and the target audience(s) they are trying to influence. It follows from this that targeted assassinations of particular individuals for purely instrumental reasons (e.g., murders of particularly effective or brutal policemen) or attacks that are solely designed to kill large numbers of people (e.g., massacres) are not, strictly speaking, acts of terrorism. They would only constitute acts of terrorism if their primary purpose was to traumatize and influence the behavior of wider target audiences. In many real-world cases, of course, attacks are carried out for both instrumental and psychological reasons, but *the latter would have to predominate in the eyes of the perpetrators* if such attacks are to be regarded, strictly speaking, as terrorism. Hence violent acts that inadvertently end up traumatizing people other than the actual victim, e.g., a series of rapes in a particular neighborhood, should not be characterized as acts of terrorism.

Thus terrorism is nothing more than a violent technique of manipulation, and like other techniques it can be used by *anyone*, whatever their ideological orientation or relationship to the state. It can be employed on behalf of state power or in opposition to state power, by left-wingers, right-wingers, or centrists, by the irreligious or the religious, and for an infinite variety of causes. One man's terrorist is therefore *not* another man's freedom fighter, as many claim; rather, one man's terrorist should invariably also be another man's terrorist, since regardless of the underlying cause involved – or whether one sympathizes with or deplors it – a terrorist can be identified purely by the methods he or she chooses to employ. It follows that only those organized groups that rely primarily on terrorist techniques can legitimately be described as terrorist groups.

However, for the purposes of this study, all violent non-state actors will be considered, even if they do not technically fall into the category of terrorists in this carefully delimited sense. That is because it seems obvious that the U.S. government is interested in any and all subnational groups that may end up carrying out acts of violence using WMD, not simply those that can legitimately be characterized as “terrorist.”

The Main Categories of Non-State Terrorist Groups

Now that the meaning of the term “terrorism” has been clarified, the principal categories of non-state terrorists in recent decades need to be identified. There are five primary types of subnational terrorist groups that have had historical significance during and after the Cold War:

1. nationalist/separatist/irredentist groups – groups relying heavily on terrorism that seek either to establish an independent state for the ethnic, linguistic, cultural, or national community with which they are affiliated, or (if they already have their own independent state) to unite all of the members of their community – including those that live in neighboring countries – under the aegis of such a state. The most important groups in this category have been the Armenian Secret Army for the Liberation of Armenia (ASALA), Euskadi ta Askatasuna (ETA: Basque Freedom and Fatherland), the Front de Libération Nationale de la Corse (FLNC: National Liberation Front of Corsica), the Irish Republican Army (IRA), the Palestine Liberation Organization (PLO), the Partiyе Karkaran-e Kurdistan (PKK: Kurdistan Worker's Party), the Liberation Tigers of

- Tamil Eelam (LTTE, also known as the Tamil Tigers), and Sikh groups seeking to create an independent state of “Khalistan.”
2. secular left-wing groups – groups relying heavily on terrorism that seek to overthrow the capitalist system and either establish a “dictatorship of the proletariat” (Marxist-Leninists) or, much more rarely, a decentralized, non-hierarchical sociopolitical system (anarchists). The most important groups in this category have been the Fuerzas Armadas Revolucionarias de Columbia (FARC: Revolutionary Armed Forces of Columbia), Sendero Luminoso (SL: Shining Path) in Peru, various Maoist groups in Nepal, and the so-called “fighting communist organizations” in Europe, such as Action Directe (AD: Direct Action) in France, the Brigate Rosse (BR: Red Brigades) and Prima Linea (PL: Front Line) in Italy, the Rote Armee Fraktion (RAF: Red Army Faction) and Bewegung 2. Juni (June 2nd Movement) in Germany, the Cellules Combattantes Communistes (CCC: Fighting Communist Cells) in Belgium, the Grupos de Resistencia Antifascista Primero de Octubre (GRAPO: October 1st Anti-Fascist Resistance Groups) in Spain, the Epanastatikē Organōsē 17 Noemvrē (17N: November 17th Revolutionary Organization) in Greece, and Devrimci-Sol (DEV-SOL: Revolutionary Left) and other groups in Turkey.
 3. secular right-wing groups – groups relying heavily on terrorism that seek to restore national greatness (radical nationalists), suppress “subversive” opponents, expel or subordinate troublesome ethnic and cultural minorities (racists), or overthrow the existing democratic and “plutocratic” capitalist systems in order to establish a revolutionary “new order” (neo-fascists). The most important groups in this broad category have been Organōsis X (the X Organization) in postwar Greece, the Organisation de l’Armée Secrète (OAS: Secret Army Organization) in French Algeria, Aginter Presse and the Exército de Libertação Português (ELP: Portuguese Liberation Army) in Portugal, Ordine Nuovo (ON: New Order) and Avanguardia Nazionale (AN: National Vanguard) in Italy, the Aktionsfront Nationaler Sozialisten (ANS: National Socialists’ Action Front) and the Odfried Hepp/Walter Kexel group in West Germany, Westland New Post (WNP) in Belgium, the Grupos Antiterroristas de Liberación (GAL: Anti-Terrorist Liberation Groups) in Spain, the Bozkurtlar (Grey Wolves) paramilitary squads affiliated with the Milliyetçilik Haket Partisi (MHP: Nationalist Action Party) in Turkey, the Alianza Anticomunista Argentina (AAA: Argentine Anti-Communist Alliance or Triple A) in Argentina, the Frente Nacionalista Patria y Libertad (PyL: Fatherland and Freedom Nationalist Front) in Chile, vigilante (“death”) squads in various Central American countries, the Afrikaner Weerstandsbeweging (AWB: Afrikaner Resistance Movement) in South Africa, and the Minutemen and the Order in the U.S.
 4. religious terrorist groups – groups relying heavily on terrorism that seek to smite the purported enemies of God and other evildoers, impose strict religious tenets or laws on society (fundamentalists), forcibly insert religion into the political sphere (i.e., those who seek to “politicize” religion, such as Christian Reconstructionists and Islamists), and/or bring about Armageddon (apocalyptic millenarian cults). This type of terrorism comes in five main varieties: 1) Islamist terrorism; 2) Jewish fundamentalist terrorism, primarily inside Israel; 3) Christian terrorism, which can be further subdivided into fundamentalist terrorism of an Orthodox (mainly in Russia), Catholic, or Protestant stamp (which, in the U.S., is especially aimed at stopping the provision of abortions) and terrorism inspired by the idiosyncratic Christian Identity doctrine; 4) Hindu fundamentalist/nationalist terrorism; and 5) terrorism carried out by apocalyptic religious cults. The most important groups in these subcategories have been Islamist groups such as al-Qa`ida (the Base or

- Foundation), Hizballah (Party of God) in Lebanon, al-Harakat al-Muqawwama al-Islamiyya (HAMAS: Islamic Resistance Movement) and al-Jihad al-Islami (Islamic Jihad, also known as PIJ) in Palestine, the Tanzim al-Jihad (Jihad Organization, also known as EIJ) and al-Jama`a al-Islamiyya (Islamic Group) in Egypt, al-Takfir wa al-Hijra (Excommunication and Migration) in North Africa, the Groupe Islamique Armé (GIA: Armed Islamic Group) and Groupe Salafiste pour la Prédication et le Combat (GSPC: Salafist Group for Preaching and Fighting) in Algeria, the Groupe Islamique Combattant Marocain (GICM: Moroccan Islamic Fighting Group) in Morocco, al-Hizb al-Tahrir al-Islami (HT: Islamic Liberation Party) in Central Asia and elsewhere, Jemaah Islamiyah (JI: Islamic Community) in island Southeast Asia, the Abu Sayyaf Group (ASG) in the Philippines, and various organizations operating in Kashmir; Teror Neged Teror (TNT: Terror Against Terror) in Israel; the Phineas Priesthood and the Covenant, the Sword, and the Arm of the Lord (CSA) in the U.S.; elements from Bajrang Dal (BD: Mighty Hanuman's Army), the youth wing of the extremist Vishva Hindu Parishad (VHP: World Hindu Council) in India; and Aum Shinrikyo (Aum Supreme Truth) in Japan.
5. single-issue groups – groups relying on terrorism that obsessively focus on very specific or relatively narrowly-defined causes of various sorts. This category includes organizations from all sides of the political spectrum, e.g., animal rights groups such as the Animal Liberation Front (ALF); anti-communist groups such as the Cuban exile organization Omega 7, the Comando de Caça aos Comunistas (CCC: Communists-Hunting Commando) in Brazil, and the [Grupos] Autodefensas Unidas de Colombia (AUC: United Self-Defense Groups of Colombia); and anti-abortion groups such as the Army of God (AOG) in the United States.

Needless to say, groups from each of these five broad categories have distinct ideologies that help to explain what they are for and against, who their friends and enemies are, and what targets they believe they can legitimately attack, but it is also the case that even superficially similar groups within each of these categories and subcategories have their own distinctive and often idiosyncratic doctrines. Moreover, it should be emphasized that these major categories of terrorism are not entirely discrete. Some essentially nationalist/separatist terrorist groups, e.g., have had a Marxist gloss (the PKK, factions of ETA), a religious gloss (certain Sikh groups), or a combination of the two (factions of the IRA). In more recent times, essentially religious terrorist groups have also displayed acute nationalist sentiments (the Islamist groups HAMAS and al-Jihad al-Islami in Palestine), and essentially nationalist terrorist groups have adopted an increasingly prominent religious coloration (important pro-Islamist factions within the Chechen separatist movement, such as that of Shamil Basayev).⁶ These types of complexities need to be kept in mind when considering their motivations for or against the use of WMD.

⁶ The mixed religious and nationalist motivations of HAMAS and al-Jihad al-Islami are widely recognized, but it is the former that clearly predominates in these two groups (in contradistinction to the motives of their political rivals in the PLO). For the “conversion” of certain key Chechen separatist factions to Islamism and their increasing resort to terrorism, see Jeffrey M. Bale, “The Chechen Resistance and Radiological Terrorism,” unpublished report, July 2003. This particular piece, which was originally prepared for a government agency, is presently slated for inclusion in a forthcoming CNS publication on the threat of radiological terrorism in Russia. By “Islamism” we are referring to a radically anti-secular and anti-Western Islamic *political ideology* with both revolutionary and revivalist elements. The principal ideological characteristics of Islamism in all of its forms are an outright rejection of Western secular values, an intransigent resistance to Western political, economic, social, and cultural influence over the Muslim world, an extreme hostility towards less committed and militant Muslims (who are often denounced as

Weapons of Mass Destruction: A Problematic Construct

The widespread and imprecise use of the term “Weapons of Mass Destruction,” which is highly misleading, is itself one of the principal obstacles to an accurate assessment of the WMD terrorist threat. Unlike the problems surrounding the definition of terrorism, the notion of WMD in popular discourse is not so much controversial as somewhat deceptive. The U.S. military defines WMD as “...weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, biological, and radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon.”⁷ The WMD label is traditionally used to refer to chemical, biological, nuclear and radiological (CBRN) weapons.⁸ The definition of WMD can include both agents specifically designed for use in warfare (such as nuclear warheads or sarin nerve gas) or agents developed for a non-military purpose but misused in order to cause significant harm, for example pesticides such as paraquat or contamination by radioactive isotopes that are used legitimately in industry or for research.

An initial fundamental point that is sometimes overlooked when discussing the WMD terrorism threat is that a weapon consists of more than just a harm agent. While chemical, biological, and radiological agents certainly have the potential for toxic effects, this potential can only be realized if the agent is actually delivered to the target. Pouring ten liters of wet anthrax slurry onto the floor of an enclosed room might contaminate a single building, but it is only when it is efficiently aerosolized and spread over a large area that the anthrax can actually infect large numbers of people. Hence the agent must not only be capable of inflicting harm, but must also be deliverable to its intended target before it can constitute a real “weapon of mass destruction.” Moreover, apart from a nuclear yield device, the scope of the effect of a WMD is almost wholly determined by the efficiency of its delivery – chemical weapons, for instance, can dissipate before harming

“apostates”), and an affirmation of the importance of creating an Islamic state governed by a rigid, puritanical application of the *shari`a*. See Jeffrey M. Bale, “Islamism,” in *Encyclopedia of Bioterrorism Defense*, ed. by Richard F. Pilch and Raymond Zilinskas (New York: Wiley, 2004), forthcoming. For more on Islamist doctrine(s), compare Emmanuel Sivan, *Radical Islam: Medieval Theology and Modern Politics* (New Haven: Yale University, 1990); Abderrahim Lamchichi, *L’islamisme politique* (Paris: Harmattan, 2001); and Ibrahim M. Abu-Rabi`, *Intellectual Origins of Islamic Resurgence in the Modern Arab World* (Albany: SUNY, 1996).

⁷ US Department of Defense. *Dictionary of Military and Associated Terms*, entry under Weapons of Mass Destruction, found at <http://www.dtic.mil/doctrine/jel/doddict/data/w/06784.html>. would exclude an actual missile, or the artillery tube that launches a chemical-armed shell.

⁸ Title 18, U.S. Code 2332a defines a weapon of mass destruction to include any explosives, incendiary charges, missiles, mines in addition to chemical, biological, radiological and nuclear agents. This definition is currently used by FEMA and, presumably, forms the basis of the FBI approach (although the FBI nowhere states this as its formal definition). Louis Freeh, then Director of the FBI, in February 1999 described weapons of mass destruction as including large conventional explosives [Statement on President’s Fiscal Year 2000 Budget Before the *Senate Committee on Appropriations*, found at <http://www.fbi.gov/congress/congress99/freehct2.htm>]. However in a congressional statement given on May 10, 2001, Director Freeh mentioned only chemical, biological and radiological agents in connection with the topic of weapons of mass destruction [found at <http://www.fbi.gov/congress/congress01/freeh051001.htm>]. This seems to indicate a potential shift (at least among U.S. domestic agencies) towards a more inclusive definition of WMD. However, the above ambivalence and international academic opinion still seem to favor a definition limited to CBRN weapons, which will be used for this report.

many people if the agent is not properly aerosolized or if meteorological conditions are unsuitable for dispersal.

The second difficulty lies in the precise quantification of “mass.” How large is the number of people that a weapon must be capable of injuring before it receives the moniker of mass destruction? Would a small amount of anthrax, capable of infecting only fifty people, qualify? What if a chemical weapon is potent enough to kill twenty people in an enclosed area or cause serious but non-mortal injuries to thousands if released in the open air? The answer to many of these questions is subjective, making any quantification fairly arbitrary; while in some cases the weapons being discussed (such as nuclear warheads, VX, or aerosolized anthrax spores) will be capable of causing thousands of casualties and thus unequivocally can be labeled “weapons of mass destruction,” one must be extremely careful about classifying many smaller scale terrorist incidents as cases involving WMD. The *Bacillus anthracis* anthrax letters sent in 2001, despite containing virulent, aerosolizable spores, were delivered through the mail with neither the intention nor the capability to cause massive numbers of casualties. Therefore, while this is undoubtedly a serious case of bioterrorism, referring to it as a WMD incident is arguably counterproductive.

The term “WMD” is especially deceptive in that although it acts as a convenient catch-all for so-called unconventional weapons, it tends to obscure important differences between the various species of such weapons and the effects they cause. The problem is rooted in the word “destruction” which traditionally connotes annihilation and physical ruin. Although the vast amounts of energy released by nuclear weapons almost always leads to true destruction, the same cannot be said for the other types of WMD. None of the chemical, biological or radiological weapons to which the term is often applied actually result in any direct physical damage to structures or infrastructure. For example, releasing anthrax does not leave a mile-wide crater in a city center. Nevertheless, all of these weapons can result in incredibly high numbers of casualties, and could therefore more accurately be labeled as “mass casualty weapons.” Moreover, since nuclear devices are the hardest of all weapons to acquire or manufacture, many scholars and policymakers have wrongly concluded that the acquisition, development, and use of CBR (chemical, biological and radiological) weapons and, by extension, acts of WMD terrorism, are likewise “low probability, high consequence” events.⁹ In actual fact, as will become clear below, crude attacks with, say, toxic chemicals are far more likely to be “high probability, low consequence” events.¹⁰

Furthermore, the most significant feature of these weapons is sometimes neither the physical destruction nor the casualties they cause, but rather the amount of disruption, both psychologically and to existing infrastructure, that result from their use. For instance, a chemical weapons attack would immediately contaminate an area and hinder the functioning of essential local services. Also, CBRN agents are inherently more frightening than guns and bombs, even when they cause similar casualty levels. There are many reasons for this phenomenon, including a natural human fear of contamination and the invasiveness of many agents, particularly biological organisms. A key anxiety-provoking factor is also the intangible nature of most of these agents, which can lead to both gnawing doubt over whether or not one has been exposed

⁹ See, e.g., Richard A. Falkenrath’s reply in “WMD Terrorism: An Exchange,” *Survival* 40:4 (Winter 1998-1999), p. 181.

¹⁰ Compare Joseph F. Pilat’s segment in *ibid*, p. 173.

and a sense of powerlessness against an unseen hazard. Psychogenic symptoms are therefore far more likely when facing CBRN agents than conventional weapons. In the Tokyo subway attack of 1995, which killed 12 people, over 4,400 of the 5,510 casualties who reported to medical facilities showed no symptoms of nerve agent exposure and were classified as the “worried well”.¹¹ That same year, the bombing of the federal building in Oklahoma City resulted in 168 deaths and injured more than 500 people. There were however, no “worried well”, which is itself an indication of the greater psychological impact of WMD, even when the fatality rate is higher with conventional weapons

The psychological effects of these weapons are often overlooked or underemphasized, resulting in at least two deficiencies in addressing the terrorist use of WMD. First, the lack of adequate resources now being devoted to mental health preparedness planning could lead to response plans that are unable to deal with the most likely consequences of the use of these agents. Second, one of the goals of terrorists is by definition, to instill as much fear as possible in an audience that is wider than those who are actually physically targeted, i.e., the victims. If the psychological effects of the use of WMD are discounted, there will be fewer attempts to mitigate these effects through measures such as pre-event education. Denying terrorists the psychological impact they seek to engender may make the attack less attractive in the first place, but this potential deterrent effect is hardly ever mentioned. Instead the constant misuse of the term “weapons of mass destruction” only serves to increase the anxiety of the public and makes even smaller-scale attacks using CBRN weapons more attractive to terrorists.

As a consequence of the above discussion, this report will use the term WMD only in the context of large-scale uses of chemical, biological, radiological weapons that have the potential to cause substantial numbers of casualties.¹² Smaller-scale CBRN incidents will be referred to as such, although the primary focus of this study is an analysis of terrorist motivations and capabilities for employing WMD.

Threat Assessment and WMD Terrorism

Besides the prevalent mischaracterization of the concept of WMD terrorism, rushed evaluations and analysis colored by public and political anxiety can result in an evaluation of the threat that omits key aspects from consideration. A basic threat assessment includes establishing the value¹³ and vulnerability of the asset under threat, as well as the capability and motivation of the potential attacker (see Figure 1). Yet most of the current discourse focuses almost solely on the capability of terrorists to engage in WMD terrorism, as well as our physical vulnerability to these

¹¹ Smithson, A and Levy, L. *Ataxia: The Chemical and Biological Terrorism Threat and the US Response*. Stimson Center Report No. 35 (2000), p. 95.

¹² The precise number of casualties required is not enumerated, although authors consider events with casualties on the order of those caused during the September 11, 2001 attacks to be mass-casualty events.

¹³ In the case of WMD terrorism, determining value is fairly straightforward: the ‘assets’ are dramatic numbers of American lives and can be regarded *ab initio* as being of high enough value to make any American policymaker concern himself or herself with countering the threat.

agents. Less quantifiable aspects, such as the strength of the terrorist's motivation to use such weapons, are just as important.¹⁴

Perhaps the most consequential element of incomplete threat assessment is the tendency to infer intention from capability. One cannot assume that because terrorists hate us and want to attack us that they will necessarily choose WMD as the means to do so, even if they desire large numbers of casualties. For instance, a fixation on the relative ease of creating a "dirty bomb" or Radiological Dispersal Device (RDD) can conceal other important questions such as "Will a dirty bomb fulfill terrorist group X's operational goals?" or "Does terrorist X's ideology permit the use of indiscriminate radiological contamination?" It is in the independent analysis of terrorist intentions that current U.S. threat assessment concerning WMD terrorism falls short, resulting in what John Parachini has labeled "spending big, but not spending smart."¹⁵ The legs of the threat assessment tripod also interact with one another in a variety of ways, and by concentrating disproportionately on only one or two of the legs we may well miss synergies that can reduce the threat.¹⁶

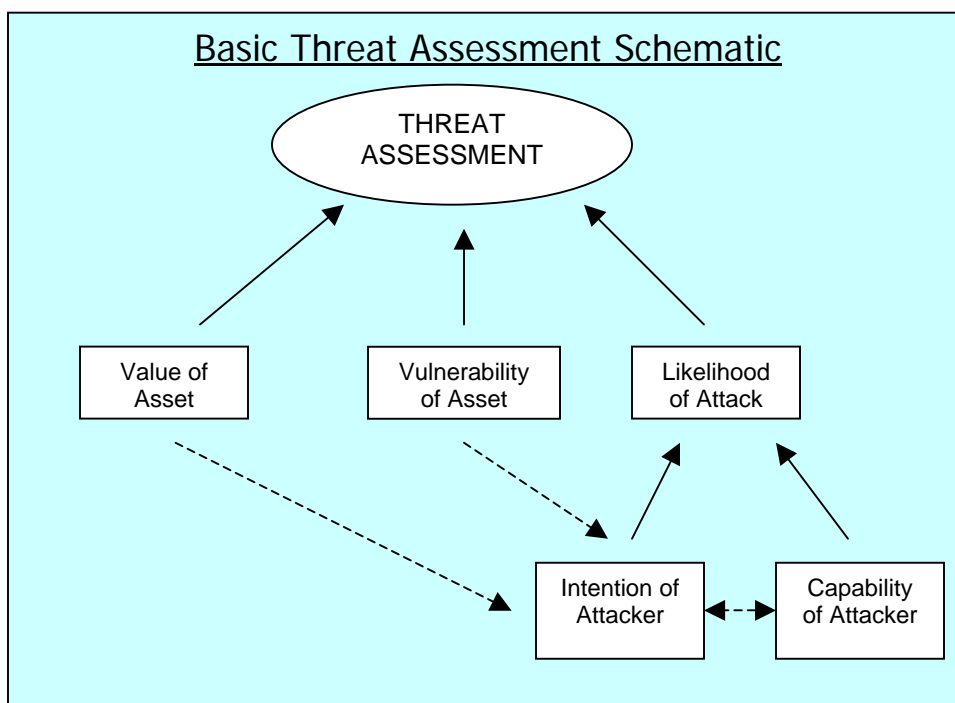


Figure 1: The Threat Assessment Tripod

¹⁴ This tendency to rely on those metrics that can be relatively more easily measured is exacerbated in democracies, where quantitative indices are often appealed to as an objective arbiter in a highly politicized decision-making process that is characterized by competing interests and divergent sources of information.

¹⁵ John Parachini, "Combating Terrorism: Assessing Threats, Risk Management, and Establishing Priorities" Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations. (July 26, 2000) available at <http://cns/pubs/reports/paraterr.htm>, p.2.

¹⁶ One obvious example - by reducing our vulnerability to a certain agent, we make an attack using that agent less attractive to terrorists.

Even the capability aspects of the problem that are the focus of so much attention and funding are sometimes overstated, especially in the area of agent delivery. As we will describe in Chapter 3, an assortment of groups and individuals with violent inclinations may now possess the organizational and logistical capability to acquire toxic materials. The basic knowledge of the workings of most WMD is also increasingly available to terrorists. However, it is one thing to acquire a lethal agent – in this vein there have been numerous media exposés about the lack of security at former Soviet military facilities but it is another matter altogether to use whatever agent has been acquired with efficiently enough to cause *mass* casualties. For example, while it is relatively easy to produce batches of certain pathogenic organisms, delivering these in a viable state so that they infect large numbers of people is a far more formidable technical challenge. Thus far the methods employed by non-state actors to disperse such weapons have been quite primitive and inefficient.

This is not to say that there are no groups who have, or may in the future have, the capability to inflict large numbers of casualties using CBRN agents. Rather, it suggests that the threat must be rationally and carefully evaluated in order to maximize the likelihood of preventing possible WMD attacks and minimizing the consequences of such an attack should it occur.

So, in order to assess the WMD threat posed by particular types of terrorist groups, this report will consider both their ideological and operational objectives and their technical and operational capabilities. This analytical approach can be rendered graphically as follows:

$$\text{Likelihood of Threat} = \text{Motivations} \times \text{Capabilities}$$

Like most pithy social science formulae, this one is overly schematic and far too simplistic to reflect the complexities of reality, yet it does point squarely to the essential factors that must be considered in terrorist threat assessments, WMD or otherwise. However, it should be pointed out that the term “motivations” encompasses three interrelated elements, a group’s 1) *ideological agenda*, its 2) overall and specific *operational objectives*, and (though this is rarely noticed, much less explicitly analyzed, by the terrorists themselves) its 3) *psychological propensities*, which has to do with how the individual and collective psychological characteristics of its members, above all its leaders, influence and are in turn influenced by its organizational dynamics.

In any event, herein the focus will be on critically evaluating both the *motivations* of different types of terrorist groups, especially their ideologies and operational objectives, and their general *capabilities* in the context of WMD. The extent to which such groups may have *opportunities* to acquire the materials necessary to develop WMD will be covered at times only expeditiously, mainly because issues related to the availability or accessibility of WMD-related materials tend to be the focus of an entirely different corpus of literature.

Methodology

This study intends to provide a broad preliminary overview and synthesis of the literature on WMD terrorism in order to provide a basis for discerning those attributes that most accurately characterize terrorist threats involving weapons of mass destruction. This set of comprehensive attributes can then be utilized in a variety of modeling and analytical efforts, giving users confidence that all significant themes present in the open sources have been included.

The Center for Nonproliferation Studies (CNS) project team conducted the research activities for this project in two phases. The first phase involved identifying the broad parameters for searching and compiling the research material and then, in conjunction with periodic reviews, actually carrying out those searches. The second phase of the project involved a careful review of the research material that was collected and the selection and prioritization of specific sources that met the criteria established by senior members of the project.

Phase I

This phase of the project was carried out between June 10 and July 5, 2004, and involved two lead investigators, one research associate, and three graduate research assistants. The lead investigators are members of the Weapons of Mass Destruction Terrorism Research Program (WMDTRP) at CNS. The lead investigators identified the parameters for collecting the research material and defined the criteria for evaluating the collected material. The stated objective of the project was to “describe and characterize terrorist threats involving weapons of mass destruction by reviewing and synthesizing prior work in the open literature.” With the aforementioned objective in mind, the lead investigators decided on the following criteria:

to focus on analytical pieces that dealt with variables and relationships explaining the terrorist motivations and capabilities to perpetrate acts of terrorism involving WMD, as well as those publications that employed models and methods for describing such threats.

The search process was greatly facilitated by the availability of both substantial in-house expertise and the large collection of research material produced or collected by CNS over the past decade. Apart from CNS’ own research material, the search efforts encompassed the following categories of sources:

- a) Books
- b) Peer-reviewed Journals
- c) Industry Publications
- d) Government Documents
- e) Commercial Threat Assessment Products

The research team followed the guidelines established by the lead investigators and collected a large amount of research material from both CNS’ in-house databases and external sources. Among the external sources, the project team used various online databases, such as LexisNexis, ProQuest, FirstSearch, ArticleFirst, and EBSCOhost, for collecting journal articles. The team also examined the websites of several research organizations involved in monitoring and analyzing terrorism-related issues. These research efforts produced a large amount of information, which was then compiled in a systematic manner.

The material collected was placed into the following categories in order to facilitate the review process and subsequent analyses:

- a) Books
- b) Government Reports

- c) Government Testimonies
- d) Monographs
- e) Journal Articles
- f) Web Reports

Note, however, that the corpus of literature collected for this pilot study cannot be said to have been comprehensive. Given the short time allotted for this project, it was simply not possible to collect and consult all of the relevant materials that touch, directly or tangentially, on various aspects of WMD terrorism. For example, foreign-language sources concerning WMD terrorism were not included, except insofar as researchers referenced them in the course of their analysis.

Phase II

The second phase of the project involved a review by the lead investigators of the literature collected on the basis of the established criteria. This phase was carried out between July 5 and August 15, 2004. In general, the review process focused on literature dealing with:

- a) terrorist motivations to use WMD and the factors that influence terrorist decision-making process with regards to target selection, weapon selection, and attack modalities;
- b) terrorist capabilities to carry out attacks using WMD and factors affecting and reflecting knowledge and technology acquisition, as well as logistical requirements;
- c) models and analytical frameworks that concerned the above two points

This particular process was designed to facilitate the next stage of the project, which involved a preliminary synthesis and evaluation of the various approaches, methodologies, hypotheses, and assertions presented in the available literature, culminating in the current report.

Structure of Report

Chapter 2 examines the motivational factors discussed in the literature as contributing to the terrorist decision to utilize WMD and summarizes the often-heated debates in this regard. Chapter 3 focuses on current and future terrorist capabilities for engaging in WMD Terrorism. It should be noted in this regard that capabilities are by no means completely independent of motivation. Although we discuss motivations and capabilities separately for purposes of descriptive clarity, it must not be forgotten that there can exist a bidirectional causal relationship between the two. On the one hand, motivation can drive capability – for instance, a terrorist group whose leaders become fixated on conducting a biological attack may postpone other operations and dedicate all their efforts to attaining this capability. On the other hand, existing capabilities can lead to a motivational bias in attack planning – a group that happens to include among its members several computer experts may be predisposed to utilizing their expertise to conduct cyber-attacks. Therefore, any assessment of a group's potential for WMD terrorism must integrate both analytical streams before a final determination of the magnitude of the threat is reached. Chapter 4 attempts to do just this and provides some general conclusions regarding the threat of WMD.

Chapter 2: Terrorist Motivations for Using WMD*

One of the peculiarities of the literature on “WMD terrorism” is the disparity between the large amount of attention paid to terrorist capabilities and the relatively small amount of attention paid to terrorist motivations. Indeed, as Jerrold Post has justly emphasized, “absent a clear understanding of the adversary’s intentions, the strategies and tactics developed [to counter them] are based primarily on knowledge of terrorists [sic] technological capabilities and give insufficient weight to psychological motivations.”¹⁷ The same observation is likewise true with respect to the *ideological motivations* and *operational objectives* of different types of terrorists.

However, before a) discussing the wide variety of reasons that might induce particular terrorist groups to acquire, develop, or employ WMD and b) identifying the types and sub-types of groups that are most likely to do so, it is first necessary to clear up some lingering terminological and conceptual confusion. Several of the theoretical and practical problems arising from the careless and indiscriminate use of the term WMD have already been highlighted in Chapter 1 of this report. Even so, in the present chapter it will be necessary to deal with some of those problems in a more explicit fashion. The use of the term “WMD terrorism” suggests that the terrorists who seek to obtain and deploy CBRN weapons intend to kill large numbers of people and destroy large amounts of property, i.e., that their principal objective is to carry out “mass casualty” attacks. In actual fact, however, terrorists and other violent groups could conceivably achieve multiple, simultaneous, or overlapping objectives by carrying out CBRN attacks. Hence it would be a serious mistake to assume *a priori* that they would be motivated to do so solely in order to inflict mass casualties.¹⁸ Therefore, a clear distinction should be drawn between the terms “CBRN” and “CBRN terrorism,” or variants thereof such as “CBR” and “CBR terrorism,” on the one hand, and “WMD” and “WMD terrorism,” on the other. The former terms will connote attacks of indeterminate scale (i.e., they could refer to smaller-scale as well as larger-scale CBRN events), while the latter terms will refer exclusively to large-scale, high-impact, mass-casualty attacks.

Operational Factors

It has already been argued that terrorism is a violent technique of psychological manipulation that necessarily involves three parties – the perpetrator(s), the victim(s), and a wider target audience or audiences – whereas normal acts of violence involve only two parties (the perpetrator[s] and victim[s]) and are generally committed for instrumental or pragmatic reasons.

* This chapter was written primarily by Jeffrey M. Bale.

¹⁷ Jerrold M. Post, “Prospects for Nuclear Terrorism: Psychological Motivations and Constraints,” in *Preventing Nuclear Terrorism*, ed. by Paul Leventhal and Yonah Alexander (Lexington, MA: D. C. Heath, 1987), p. 91. Although this remark is nearly twenty years old and was made solely in reference to nuclear terrorism, the overall situation has not changed all that much since then. For every article that discusses terrorist motivations for using WMD, there are dozens of “threat” and “vulnerability” assessments that focus almost exclusively on narrowly technical matters, including the technological capabilities that terrorists would need in order to launch a successful “WMD” attack.

¹⁸ Jeffrey M. Bale, “Responses to Questions concerning CBRN Terrorism,” unpublished report, January 2004, p. 1.

From this it follows that attacks which are solely designed to kill large numbers of people are not really acts of bona fide terrorism at all. They are better described as acts of mass murder (or perhaps as acts of war, if one takes the hyperbolic and often metaphorical rhetoric of both terrorists and their state opponents at face value). In contrast, the phrase “mass casualty terrorism” properly refers to attacks that are intentionally designed to exert an impact upon wider target audiences by means of the production of large numbers of casualties.¹⁹ This key distinction, and others as well, can easily be illustrated by reference to the possible motives behind the catastrophic attacks on 9/11. If the principal purpose of ‘Usama bin Ladin and ‘Ayman al-Zawahiri, whose al-Qa`ida network sponsored and later claimed responsibility for those near simultaneous attacks, was simply to kill large numbers of people, it would have constituted an act of mass murder rather than terrorism. If their primary aim was simply to destroy the Twin Towers and damage the U.S. economy, it would have constituted an unusually destructive act of sabotage or economic warfare rather than terrorism. If their principal purpose had been to exert a psychological impact by physically destroying key symbols of American economic and military power, irrespective of the number of human casualties, it would have been a simple act of terrorism. But if their purpose was to exert a tremendous psychological impact by killing large numbers of people, as seems likely, it constituted an act of “mass casualty terrorism” per se. However, in this instance al-Qa`ida seems to have had multiple aims for launching the attack, none of which are necessarily mutually exclusive – to destroy the physical symbols of American power, to damage the U.S. economy severely, to kill particular military personnel in the Pentagon, to commit mass murder, and/or to commit a traumatic act of mass casualty terrorism.²⁰

Of course, 9/11 was an unconventional attack launched with more or less conventional means. By extension, however, one can easily imagine scenarios involving the use of different types of CBRN that might also serve multiple purposes. For example, if a Radiological Dispersal Device (RDD) or “dirty bomb” was detonated in a major American city, the aim of the perpetrators could be:

- 1) to kill the individuals unfortunate enough to be within the blast radius;
- 2) to irradiate a much larger number of individuals, depending upon the precise nature of the radioactive materials used;
- 3) to traumatize other residents of the city, whose lack of scientific knowledge and overriding fears of contamination could produce debilitating long term psychological effects;

¹⁹ *Ibid.* Other than Bale the only author who has emphasized the need to examine terrorists’ potential use of CBRN weapons explicitly within the framework of the impact that they hope to exert on target audiences is Daniel S. Gressang IV, “Audience and Message: Assessing Terrorist WMD Potential,” *Terrorism and Political Violence* 13:3 (Autumn 2001), pp. 83-106. As he puts it (*ibid.*, p. 85), “terrorists are alike in at least one important way: they seek to acquire and maintain some degree of influence over an identifiable audience. While that audience may vary widely, the desire to have and exercise influence is seen as the most basic driving motivation of terrorists, regardless of additional motivational, ideological or theological imperatives.” From this it follows that, when speaking of terrorism in the strict sense, “the content and context of the terrorist’s message to his primary audience is a critical component for understanding the linkage between motive and action.” *Ibid.*, p. 89. The common neglect of this factor in discussions of WMD terrorism, whether explicit or implicit, is rather odd given that so many terrorism experts acknowledge that *at least* one of the distinguishing characteristics of terrorist violence is that it is intended to influence a wider audience.

²⁰ Bale, “Responses to Questions concerning CBRN Terrorism,” pp. 2-3.

- 4) to contaminate vital sections of the city, such as the downtown business district, so as to inflict lasting economic damage; or
- 5) all of the above.

Every type of agent or weapon that falls within the CBRN category might likewise be employed for any number of potential reasons, both material and psychological, and not necessarily only to inflict mass casualties. Indeed, in the past CBR materials have more often been used to poison or contaminate specific individuals, with the intention of either injuring or murdering them.²¹

In short, the objectives for carrying out CBR attacks can vary greatly, both in terms of the actual impact sought and the political or religious goals being pursued.²² Impact-wise, they could be seen as a means to diverse ends, including the precipitation of small or large numbers of casualties, minor or severe material damage, or varying levels of psychological trauma. Alternatively, they could conceivably be carried out as an end in themselves, especially if the perpetrator(s) had some sort of technological fetish or was otherwise driven by an inner compulsion to utilize unconventional weapons, in the same way that setting fires appeals to certain types of arsonists entirely for idiosyncratic, subliminal psychological reasons rather than for rational, instrumental ones (e.g., bilking insurance companies, getting revenge on someone, etc.). As it happens, although most analysts concerned with these issues have pointed to a variety of possible terrorist motives for employing CBRN weapons, few if any have as yet attempted to enumerate and evaluate those motives in a systematic fashion.²³ For this very reason, several such purported motives need to be considered in more detail below.

The most obvious of these, and the one that many non-specialists and casual observers seem to think is the only one, is a desire to inflict mass casualties on declared enemies. Certainly, terrorist groups that wish to kill large numbers of people might well be interested in acquiring or deploying CBRN weapons insofar as they believe – rightly or wrongly – that such weapons will enable them to accomplish this goal.²⁴ Indeed, since more and more information about the fabrication of such weapons is becoming available to members of the public, including would-be

²¹ This is not only true of frustrated individuals holding personal grudges, but also of subnational groups that wished to eliminate designated enemies and of regimes that intentionally established covert CBW programs in large part to assassinate “enemies of the state,” such as South Africa. See the detailed overviews of both the South African BW and CW programs by Jeffrey M. Bale on the Nuclear Threat Initiative website: www.nti.org/e_research/profiles/SAfrica/index.html. Compare also Chandre Gould and Peter Folb, *Project Coast: Apartheid’s Chemical and Biological Warfare Programmes* (Geneva: United Nations Institute for Disarmament Research/Centre for Conflict Resolution, 2002).

²² The most complete catalog of prior CBRN terrorist threats, hoaxes, and attacks can be found in the Center for Nonproliferation Studies’ (CNS) WMD Terrorism database. For the non-subscription version of this database, which currently lists 1154 incidents, see cns.miis.edu/db/wmdt_demo/index.htm.

²³ Perhaps the most systematic single effort to address terrorist motivational incentives and disincentives for using CBRN weapons is that of Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002). For example, therein (pp. 92-103) they discuss the operational pros and cons of using such weapons for indiscriminate attacks on population targets, assassinations, attacking military facilities, doing economic damage, blackmail and intimidation, generating propaganda, attacking key buildings and sites as well as nuclear and chemical facilities (i.e., critical infrastructure), and deterrence.

²⁴ Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles’ Heal: Nuclear, Biological, and Chemical Terrorism and Covert Attack* (Cambridge, MA: M.I.T, 1998), pp. 205-6.

terrorists, and since “new” types of subnational groups increasingly seem to be interested in carrying out mass casualty attacks, some observers have simply assumed that this will lead them to deploy CBR – if not N - weapons in acts of WMD terrorism, properly speaking.²⁵

There are, however, serious theoretical and practical problems with this assumption, apart from the difficulties involved in overcoming technical hurdles or the residual reluctance to transgress long-standing moral taboos, which suggest that this potential transition is anything but inevitable. The theoretical problem, which has been discussed at some length in Chapter 1 but bears reiterating in the specific context of motivations, has to do with scale, specifically how the term “mass casualty” is defined and delimited. Exactly how many people – dozens, hundreds, thousands, tens of thousands, hundreds of thousands, or millions – actually have to be killed or injured for an incident to fall into the “mass casualty” category?²⁶ The practical problem, which is only tangentially related to how the term itself ends up being defined and delimited by scholars and policymakers, is whether violence-prone groups really need to have recourse to CBRN in order to generate “mass casualties,” i.e., relatively large numbers of casualties. If terrorists are satisfied with killing “only” dozens or hundreds of people, they will likely find it both easier and less risky to continue employing powerful conventional weapons (above all military-grade explosives) to carry out effective “mass casualty” attacks.²⁷ Viewed from this perspective, the vehicular bombings of the Alfred P. Murrah Federal Building in Oklahoma City by Timothy McVeigh and of the tourist-friendly nightclubs in Bali by Jemaah Islamiyah, not to mention the 9/11 attacks and March 11, 2004 train bombings in Madrid by al-Qa`ida operatives, can be classified as acts of “mass casualty terrorism” even though they did not involve CBRN

²⁵ Richard A. Falkenrath, “Confronting Nuclear, Biological and Chemical Terrorism,” *Survival* 40:3 (Autumn 1998), p. 53. Compare also Joseph W. Foxell, Jr., “The Debate on the Potential for Mass-Casualty Terrorism: The Challenge to US Security,” *Terrorism and Political Violence* 11:1 (Spring 1999), p. 96, who argues that “mass-destruction terrorism may rapidly become the predominant form of sociopolitical violence in the twenty-first century” and describes “mass-destructive-capability weapons” as “quintessential devices of terror” able to visit “apocalyptic [sic] devastation” that could result in civilian deaths on an “unprecedented” scale; as well as the remarks of Francis H. Marlo, “WMD Terrorism and US Intelligence Collection,” *Terrorism and Political Violence* 11:3 (Autumn 1999), p. 55: “the increasing willingness to engage in mass murder makes terrorists more likely to consider WMD as usable and even preferable to conventional explosives and other traditional terrorist weaponry.”

²⁶ Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000), pp. 163-4. One attempt at definition, albeit of “mass destruction terrorism” rather than “mass casualty terrorism,” has been made by Foxell, “Debate on the Potential for Mass-Casualty Terrorism,” p. 98: “mass-scale violence purposed [sic] to cause immense death tolls enacted through use of weapons capable of killing or sickening large numbers *en masse*.” Yet even he is vague about what “large numbers” might be.

²⁷ Compare Arpad Palfy, “Weapon System Selection and Mass-Casualty Terrorism,” *Terrorism and Political Violence* 15:2 (Summer 2003), p. 82: “the use of unconventional [CBRN] weapons is largely dependent on the terrorists’ desired mission outcome...missions *specifically* seeking to cause large amounts of casualties, even if only as a means to a desired end, will tend to employ weapons of a more conventional nature, though will perhaps do so in more elaborate ways. Conversely, terrorist missions seeking to disrupt, intimidate, or otherwise interrupt the regular functioning of a state, *irrespective* of total casualties and fatalities produced, may be tempted to employ chemical or biological-type weapons.” One reason for the common terrorist preference for using military grade conventional weapons in mass casualty attacks – in addition to their proven power and effectiveness – is that “most, if not all, terrorist operations require a level of simplicity and cleverness as far from the maximum threshold of complexity as possible in order to achieve the desired outcomes.” *Ibid*, p. 87.

weapons.²⁸ On the other hand, if terrorists hope to kill hundreds of thousands or millions of people, they will almost certainly be motivated to acquire and use WMD. Yet it is important to note that certain types of weapons that have traditionally been categorized as WMD, specifically chemical agents and radiological materials, would not enable them to cause that many casualties, even under optimal conditions. Hence any violence-prone non-state group aiming at the wholesale murder of designated enemies would either have to acquire and successfully detonate a functional nuclear device, precipitate a “meltdown” at an existing nuclear plant, or properly disseminate lethal and preferably highly contagious biological pathogens, actions that have the capacity to kill millions but are fortunately also exceedingly difficult to carry out.²⁹ In sum, even if a particular subnational group was fixated on carrying out the kind of attacks that could produce relatively high death tolls, this would not automatically mean that it would seek to obtain and use CBR weapons.³⁰

Instead, the most important single factor that would arguably motivate terrorists – in the strictest sense of that term – to employ CBRN weapons is a desire to exert a tremendous psychological impact on one or more target audiences, perhaps including both their enemies, who would be stunned if not cowed, and their supporters, who would be impressed if not inspired.³¹ It has been suggested above that if causing mass casualties and/or extensive physical destruction is their sole aim, terrorists may well recognize that conventional terrorist attacks can be every bit as destructive and devastating as CBR attacks, if not much more so. (The only clear exception would be the successful detonation of an actual nuclear device.) In such a case, they would not necessarily see any particular advantage in employing CBR. But if the primary aim of particular non-state actors is to traumatize a wider target audience (or multiple audiences) psychologically, they are likely to prefer using CBR provided that they have the technical capacity to do so and the costs that they might incur as a result are not too great. Why? Because only the most spectacular conventional attacks, like those of 9/11, would be likely to have the same emotional impact as even a moderately effective smaller-scale CBR attack. Due to the lay public’s primal fears of contamination and infection from unseen agents, a CBR terrorist attack that “only” caused a couple of dozen deaths would probably have a more traumatic and terrifying impact

²⁸ Compare Cameron, “WMD Terrorism in the United States,” p. 164.

²⁹ Indeed, if the high casualty figures resulting from an attack – or that could potentially result from an attack – are the sole criteria for identifying them as acts of “WMD terrorism,” then “terrorist attacks using non-conventional [CBR] weapons are not necessarily examples of WMD terrorism. NBC [Nuclear, Biological and Chemical] materials do not equate to WMD...It is not the material used, but whether it has been turned into a weapon that could be used effectively to kill many people, that makes the difference.” See *ibid*.

³⁰ However, as Gurr and Cole rightly emphasize (*New Face of Terrorism*, p. 90), large-scale (or mass casualty) attacks are not necessarily “indiscriminate,” just as smaller-scale attacks are not necessarily “discriminate.” For example, the bombings of the U.S. Marine base in Beirut by a Hizballah front group and the Oklahoma City federal building by McVeigh were both large-scale conventional attacks that were very costly in human lives, but they were quite discriminate insofar as their selection as targets was concerned. After all, the Marines were viewed as “occupying” foreign military personnel, whereas the employees working in the Murrah building were mainly government officials who allegedly served the interests of the anti-American “New World Order.” Conversely, if a gunman enters an airport and starts shooting people randomly, that would be a small-scale but “indiscriminate” attack.

³¹ Falkenrath et al, *America’s Achilles’ Heel*, pp. 206-7; Gordon H. McCormick, “Terrorist Decision Making,” *Annual Reviews in Political Science* 6 (2003), pp. 479-80; David Claridge, “Exploding the Myths of Superterrorism,” *Terrorism and Political Violence* 11:4 (Winter 1999), p. 141. This type of action falls under the category of “propaganda” in the analysis of Gurr and Cole, *New Face of Terrorism*, pp. 98-100.

than a conventional terrorist attack that killed hundreds.³² This is certainly the lesson of both the Aum Shinrikyo case, which attracted inordinate attention due to the group's use of CBW agents, and the 2001 *Bacillus anthracis* letter mailing incidents in the United States. Indeed, given the growing frequency of mass casualty Islamist terrorist bombings, it could be argued that only conventional attacks that result in thousands of deaths will nowadays be likely to have the same psychological *frisson* as successful acts of CBR terrorism, whatever their scale. In that sense CBRN weapons are almost ideally suited for terrorism proper, since their employment is almost guaranteed to exert a profound effect on the psyches of the wider audiences that terrorists are by definition trying to influence with their acts of violence.

A third major reason that non-state actors, like states, might decide to employ CBR materials is to carry out assassinations, which are by definition narrowly targeted, highly selective murders that fall on the opposite end of the spectrum from "mass casualty attacks." As noted above, most of the prior uses of bona fide CBR materials have involved efforts to poison one or more individuals.³³ For example, 79% of the 79 cases in the Monterey Institute's WMD Terrorism Database fall into this category.³⁴ In that sense, far from being used primarily to inflict large numbers of casualties in catastrophic attacks, these types of "WMD" have thus far generally been deployed in "tactical or discrete attacks" to achieve far more limited and practical effects.³⁵ Indeed, CBR materials might specifically be used to incapacitate rather than to kill, as in fact the Rajneeshee cult used *Salmonella typhimurium* bacteria in an effort to prevent non-members from voting in an upcoming local Oregon election.³⁶ Moreover, as Jean Pascal Zanders has noted, many of the past cases of poisoning with such materials can more accurately be "classified as attempts at homicide, suicide, or criminal extortion motivated by financial rather than political gain."³⁷ To financial gain one should also add personal animosities and other idiosyncratic individual motives. Once again, then, the phrase WMD seems singularly inappropriate when describing the real purposes of most prior CBR incidents.

³² See also the remarks of Jonathan B. Tucker and Amy Sands, "An Unlikely Threat," *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), p. 49. They also highlight some of the reasons for this disproportionate psychological impact: "[CBW weapons] are generally invisible, odorless, tasteless, silent, and insidious," and as a result they tend to "evoke deep human anxieties and instill a qualitatively different type of terror" than, say, cathartic explosions. Compare Falkenrath, "Confronting Nuclear, Biological and Chemical Terrorism," p. 49. In addition to triggering a "panic incommensurate with the real effects of the weapons," he also lists six other supposed "general consequences" of a major NBC attack: massive casualties, contamination, degraded response capabilities, economic damage, loss of strategic position, and social-psychological damage resulting in political changes.

³³ Alex P. Schmid, "Chemical Terrorism: Precedents and Prospects," *Synthesis* (Summer 2001), electronic p. 1, at www.opcw.org/synthesis/html/s6/p9prt.html: "the use of the term 'weapons of mass destruction' is misleading, since what takes place with such chemical and biological agents has been mostly individual murder by poisoning, or a few killings with a substance that could also be a weapon of mass destruction if used to its full potential." On electronic p. 3 of this article, he goes on to note, as we have above, that "assassination...is not the same thing as terrorism."

³⁴ Descriptive statistics drawn from WMD Terrorism Database.

³⁵ Jonathan B. Tucker, "Lessons from the Case Studies," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. by idem (Cambridge, MA: M.I.T., 2000), p. 267.

³⁶ Tucker and Sands, "An Unlikely Threat," p. 50. For this case, see further W. Seth Carus, "The Rajneeshees," in *Toxic Terror*, pp. 115-37.

³⁷ Jean Pascal Zanders, "Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists," *Nonproliferation Review* 6:4 (Autumn 1999), p. 19.

Apart from these three primary motives or objectives, there are a number of subsidiary operational, ideological, and psychological factors that might cause terrorists to utilize CBRN weapons. Various ideological and psychological motives will be examined in the next section, but, with regard to potential operational motives, a subnational group may wish to contaminate key areas or facilities, including those which are widely regarded as vital to the normal functioning of a given nation's "critical infrastructure," including its economy and political system.³⁸ Certain highly toxic and persistent CBR materials and weapons, such as mustard, VX, dioxin, *B. anthracis*, and cobalt-60, are particularly well suited to the accomplishment of such an objective. Similarly, a group might wish to deploy certain CBRN materials because many of them are ideally suited for covert delivery.³⁹ For example, a small vial of biological pathogens or a small container of toxic chemicals can easily be transported to a crowded location, hidden in a trash container or placed under a seat, and then broken or otherwise opened so that the substance inside will be released. If the bearer has been provided with an antidote, vaccine, or a tiny protective breathing apparatus beforehand, he or she can then probably depart unnoticed and safely escape. Moreover, in the case of a biological agent whose harmful effects will not manifest themselves for hours or even days, the escape of its bearer will be virtually assured, long before any disease symptoms appear. Indeed, a sudden outbreak of disease may well be initially regarded as natural by medical personnel, thereby enabling the perpetrators and/or their covert sponsors to maintain "plausible deniability" – assuming that they actually want to keep their involvement secret instead of boasting about their spectacular unconventional attack.⁴⁰ CB materials are also relatively inexpensive to acquire, as is discussed in Chapter 3.⁴¹

These, then, are some of the specific operational objectives that might cause terrorists to employ CBRN weapons. It should be emphasized again and again that terrorism, unlike the arguably baser, more primitive impulses of exacting bloody revenge on one's enemies or smiting purportedly "sinful" evildoers in the name of one's gods, is normally a purposive, rational tactical choice.⁴² Although terrorists and other non-state actors never engage in the sort of formal "cost-benefit" analyses that many social scientists futilely seek to model, and their "rationality"

³⁸ Falkenrath, "Confronting Nuclear, Chemical and Biological Terrorism," p. 49, where both "contamination" and "economic damage" are listed, albeit separately, as being among the consequences of a "WMD" terrorist attack. This scheme has been accepted but embellished by Gurr and Cole, *New Face of Terrorism*, pp. 83-5.

³⁹ Falkenrath, "Confronting Nuclear, Chemical and Biological Terrorism," p. 46; idem et al, *America's Achilles' Heal*, pp. 138-44; Cameron, "WMD Terrorism in the United States," p. 166; Tucker and Sands, "An Unlikely Threat," p. 50.

⁴⁰ *Ibid*, p. 50. However, they rightly point out that such a delay might be viewed as a disadvantage by other terrorists, since it may lessen the psychological impact of their attack.

⁴¹ Claridge, "Exploding the Myths of Superterrorism," p. 141.

⁴² Compare Gressang, "Audience and Message," p. 91: "Terrorist actions are purposive acts, designed to produce, directly or indirectly, expected outcomes... Each act serves a purpose, whether the audience understands that purpose or not." However, terrorist "rationality" should not be exaggerated. From the days of Karl Heinzen in the mid-nineteenth century, certain radicals and observers have drawn a distinction between terrorism as a utilitarian and thus a rational act and terrorism as an expressive act, above all an act of personal redemption. See McCormick, "Terrorist Decision Making," pp. 477-8. Although these two categories are not necessarily discrete, much less mutually exclusive, some scholars rightly emphasize the individual and collective (i.e., group-oriented) psychological functions terrorism serves rather than only its narrowly instrumental functions. See, e.g., Jerrold M. Post, "Terrorist Psycho-Logic: Terrorist Behavior as a Produce of Psychological Forces," in *Origins of Terrorism*, pp. 25-40; and Walter Reich, "Understanding Terrorist Behavior: The Limits and Opportunities of Psychological Inquiry," in *ibid*, pp. 261-79.

may not be comprehensible to outsiders, they normally carry out their acts of violence in order to achieve calculated operational objectives.⁴³ To the extent that this is true, whether terrorists choose to employ CBRN weapons will largely depend – assuming that a) they have the technical capabilities to do so, and b) the use of such weapons is not utterly antithetical to their ideological agendas and/or psychological make-up – on whether “the operational advantages that their use might be perceived to confer” is seen as outweighing “the operational disadvantages that their use might incur.”⁴⁴ From this perspective, a group’s decision to use CBRN, like its other decisions concerning targeting, weaponry, and tactics, will generally be based on some sort of rational strategic calculation or choice.⁴⁵

Ideological and Psychological Factors

Before discussing the types of subnational groups that may be particularly inclined to employ WMD or CBRN weapons in covert attacks, the role of ideology in the process of target and weapon selection needs to be clarified. In this context, the term “ideology” refers to the basic set of political, social, cultural, and/or religious beliefs that members of particular violence-prone non-state groups hold. Ideology plays a decisive, and perhaps even preeminent, role in the selection of targets, tactical methods, and weapons by terrorist groups.⁴⁶ The manner by which such groups make these decisions is an involved process which necessarily varies somewhat from group to group, but in general can be characterized as follows. First, a group’s ideology, by explicitly indicating what the group is “for” and “against,” essentially establishes the outside range of possible human and non-human targets that its members can legitimately attack. This maximal range of targets is then further limited by the group’s specific operational objectives for launching a particular attack. Once those objectives have been determined, several targets will be identified that might enable the group to achieve its objectives. At that point the group will consider which of those targets can be successfully attacked given its own operational capabilities. After the potential range of targets has been further reduced and various specific targets have been identified in a preliminary way, the group will then conduct close surveillance to determine which of these are most vulnerable, i.e., which can likely be attacked successfully. After that determination has been made, a final target will be selected and additional information will be collected on the layout and configuration of the target, its levels of protection, its peculiar vulnerabilities, approaches to and from the site, etc. When the group feels that it has acquired

⁴³ See especially Martha Crenshaw, “The Logic of Terrorism: Terrorist Behavior as a Product of Strategic Choice,” in *Origins of Terrorism: Psychologies, Ideologies, Theologies, States of Mind*, ed. by Walter Reich (Washington, DC: Woodrow Wilson International Center for Scholars, 1998), pp. 7-24; McCormick, “Terrorist Decision Making,” p. 481.

⁴⁴ Gurr and Cole, *New Face of Terrorism*, p. 91. See also *ibid*, p. 80.

⁴⁵ [David Rapoport, “Terrorism and Weapons of the Apocalypse,” *National Security Studies Quarterly* 5:3 (Summer 1999), pp. ?. Compare Ehud Sprinzak,]

⁴⁶ Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism* 24:3 (May 2001), p. 193: the “philosophical and ideological views of a group – including both the espoused philosophy of the organization and the “actual” philosophy revealed by the group’s actions – are...critical in determining whether it will seek out new technology.”

enough information on the target, it will develop a specific plan of attack, choose weapons suitable for accomplishing its goals, and then launch the attack.⁴⁷

Obviously, this is a highly schematic overview of the general process for selecting targets and the methods for attacking them, many phases of which are in fact likely carried out simultaneously. Moreover, in some instances certain of these phases will be telescoped or eliminated altogether, and there are also no doubt many cases in which such decisions are made in a far more impulsive and haphazard manner. All of these processes will be heavily influenced in particular cases both by the nature of the group and its internal dynamics, above all the characteristics of its leaders and their style and method of making decisions, as well as by external factors such as changes in the security environment, the group's links with other actors whose assistance may be necessary, and a variety of other factors. In short, in the "real world" there are many possible paths that may lead from a group's ideological proclivities to its determination of operational objectives to its final selection of targets, tactics, and weapons, but these can only be determined with more specificity after in-depth qualitative studies of particular groups have been carried out.

In any case, if one hopes to shed light on why certain types of terrorist groups might be more inclined to carry out CBRN or WMD attacks than others, it is probably useful to divide the postwar history of terrorism into 1) an earlier era dominated by secular (or at least secularized) political terrorist organizations demanding political independence or espousing utopian revolutionary ideologies, whether of the left or right; and 2) a more recent period in which religious terrorism, i.e., terrorism inspired by religious doctrines and imperatives, has come to the fore. During this latter period, "a surge of religious fanaticism has manifested itself in spectacular acts of terrorism all across the globe...[a] wave of violence that is unprecedented, not only in its scope and the selection of targets, but also in its lethality and indiscriminate character."⁴⁸ It can be argued that the factors inhibiting or facilitating the use of CBR differed somewhat, and in certain respects perhaps quite significantly, during these two eras.

The first of these two periods, which lasted roughly from the early 1960s to the early 1980s, was dominated on the one hand by nationalist/separatist/irredentist terrorism and on the other by ideological left- and right-wing terrorism. For both practical and ethical reasons, these types of groups were generally less likely to resort to CBR or WMD terrorism than insular or transnational groups of religious extremists.

As far as such traditional nationalist and separatist groups are concerned, there were two factors that seem to have especially militated against their use of WMD:

⁴⁷ This particular scheme was first developed and elaborated by a CNS research team headed by Gary Ackerman and Jeffrey Bale, specifically in connection with a project designed to assess terrorist motivations for targeting and attacking Critical Infrastructure in the United States.

⁴⁸ Magnus Ranstorp, "Terrorism in the Name of Religion," *Journal of International Affairs* 50:1 (Summer 1996), p. 43. Of course, as David Rapoport and many others have pointed out – see, e.g., Rapoport's "Fear and Trembling: Terrorism in Three Religious Traditions," *American Political Science Review* 78:3 (September 1984), pp. 658-77 – religious motivations had long served as the primary inspiration for terrorism, and in that sense their recent flowering in virulent new guises is only surprising insofar as they have partially displaced secular motivations that were once thought to signal the decline of religiosity. Alas, since the mid-1970s there has been an unanticipated resurgence of religiosity in many parts of the world. See especially Gilles Kepel, *The Revenge of God: The Resurgence of Islam, Christianity and Judaism in the Modern World* (University Park: Pennsylvania State University, 1994).

- 1) they tended to operate within a delimited geographical sphere, a relatively vulnerable piece of territory occupied by their ethnic confreres, who might thereafter have been subjected to harsh retaliatory measures by those they attacked in this way; and
- 2) they generally hoped to elicit broader international support for their independence struggles or their collective efforts to redress legitimate grievances, support that would have been likely to erode significantly had they crossed the WMD threshold

One may object that ethnic hatreds (especially those infused with religious sectarianism) often lead to the commission of atrocities against designated “out-groups,” that there are several instances of nationalist terrorist groups carrying out or threatening to carry out CBR attacks,⁴⁹ and that a number of such groups, including radical factions of the PLO and IRA, were not dissuaded from conducting other types of cold-blooded, brutal actions that proved to be counterproductive in the sense that they shocked the sensibilities of potential international sympathizers, if not always their own constituents. But such cases involving CBR have been extraordinarily rare.

As for Cold War-era ideological terrorist groups, similar desires to elicit broader international support and sympathy for their causes may well have served as a brake on their commission of acts of WMD or CBRN terrorism. Here a distinction should probably be drawn between far left groups that embraced Marxist or anarchist doctrines, and “far right” groups that adhered to neo-fascist or neo-Nazi doctrines,⁵⁰ even though all four fall into the category of utopian revolutionary ideologies with quasi-religious characteristics.⁵¹ The former generally targeted specific “class enemies” or representatives of the “imperialist state of the multinationals,”

⁴⁹ One such case involving the Tamil Tigers has been briefly discussed by John Parachini, “Putting WMD Terrorism into Perspective,” *Washington Quarterly* 26:4 (Autumn 2003), pp. 43-4. Several other cases can be found in CNS’ WMD Terrorism database.

⁵⁰ Here we are using the term “far right” merely for the sake of convenience and in order to avoid unnecessary confusion, even though fascism (and, to a lesser extent, its atypical, race-obsessed Hitlerian Nazi variant) was in actuality an outgrowth of turn-of-the-century attempts by an odd assortment of disillusioned revolutionaries and radicals to conjoin particular European intellectual currents from both the right and the left, specifically radical nationalism and non-Marxist socialism, and thereby create a new type of revolutionary nationalist movement. See especially Eugen Weber, *Varieties of Fascism: Doctrines of Revolution in the Twentieth Century* (Princeton, NJ: Van Nostrand, 1964); and Zeev Sternhell, “Fascist Ideology,” in *Fascism: A Reader’s Guide. Analyses, Interpretations, Bibliography*, ed. by Walter Laqueur (Berkeley: University of California, 1976), pp. 325-406.

⁵¹ In classes that Bale has taught over the years, he has often described communism and fascism as the “two great secular religions of the twentieth century,” by which he means that they were able to elicit similar degrees of self-sacrifice among their followers, had pronounced ritualistic and ceremonial aspects, and were rooted in almost equally Manichean worldviews. Even so, these utopian secular revolutionary movements viewed the cataclysmic struggle between good and evil as something that was taking place solely on the material plane of this world, whereas religious movements view it, by definition, as a cosmic struggle that occurs both in this world and – that which is more important – on a higher spiritual plane. For the “cosmic” dimension of religious struggles, see Mark Juergensmeyer, *Terror in the Mind of God: The Global Rise of Religious Violence* (Berkeley: University of California, 2003), pp. 148-66. Moreover, self-sacrifice becomes rather easier when one imagines that it will lead to immediate entry into an other-worldly paradise, which is why “martyrdom operations” in the form of acts of “suicide” terrorism are generally carried out by members of extremist religious groups (with the exception of the Tamil Tigers, whose suicide attacks are nonetheless also undergirded by Hindu religious ceremonies and symbols).

claimed responsibility for their attacks, and eschewed both WMD terrorism and CBR terrorism, whether for moral or purely instrumental political reasons. (Even so, one of their immediate objectives was to provoke state repression so as to awaken the exploited masses to the supposedly “fascist” nature of “bourgeois” pseudo-democratic states. It is thus hard to explain why they failed to recognize that conducting a CBR attack would have been likely to generate just such an overreaction and crackdown by the authorities.⁵²) In general their right-wing counterparts were less liable to claim responsibility and more likely to carry out mass casualty attacks (such as bombings of banks, public squares, commuter trains, and train stations), often in the context of covert “false flag” operations specifically designed to implicate the far left.⁵³ Despite this, they too rarely displayed any serious interest in CBR terrorism.⁵⁴ These last remarks are clearly applicable to the veteran neo-fascist terrorists in Europe, but are not nearly as applicable to “right-wing” radicals elsewhere, who have often been driven by markedly less secular worldviews (e.g., idiosyncratic Christian paramilitary groups in America).

In sum, although it is true that there are a wide variety of internal and external factors that might cause secular terrorist groups to risk alienating their proclaimed constituencies and would-be sympathizers by perpetrating atrocities of one kind or other, such as a perceived need to demonstrate continued operational effectiveness, rally the spirits of disillusioned members and hardcore supporters, or teach a pointed lesson to their opponents, it is also the case that they previously considered – and will likely continue to consider – certain types of actions to be

⁵² Gurr and Cole refer to this cynical strategy of intentionally provoking state repression as “polarizing communities.” See *New Face of Terrorism*, p. 89. There are two allegations involving the Rote Armee Fraktion (RAF) and CB agents, one in which they supposedly threatened to use stolen canisters of mustard agent against German cities, the other in which botulinum toxin was reportedly found in a makeshift laboratory at an RAF safe house in Paris, but both appear to have been untrue. For details see, respectively, David Claridge, “The Baader-Meinhof Gang (1975),” in *Toxic Terror*, pp. 95-106; and Terence Taylor and Tim Trevan, “The Red Army Faction (1980),” in *ibid.*, pp. 106-13.

⁵³ The best illustration of this is provided by the terrorist “strategy of tension” in Italy, but similar tactics were also systematically employed by neo-fascist terrorists in Greece, the Iberian Peninsula, and parts of Latin America. For an overview, see Jeffrey M. Bale, “Terrorism, Right-Wing,” in *Europe since 1945: An Encyclopedia*, ed. by Bernard A. Cook (New York: Garland, 2001), volume 2, pp. 1238-40. For a scholarly English-language treatment of the “strategy of tension,” see especially Franco Ferraresi, *Threats to Democracy: The Radical Right in Italy after the War* (Princeton: Princeton University, 1996), especially chapters 4-6. For an insightful introduction to this oft-ignored but crucially important pattern of covert state manipulation of terrorism, see Philip Jenkins, *Images of Terror: What We Can and Can't Know about Terrorism* (Hawthorne, NY: Aldine de Gruyter, 2003), pp. 87-109.

⁵⁴ The only case that we know of, which does not appear in any of the available listings of WMD terrorism incidents, was that of Eliodoro Pomar, a nuclear engineer and activist in an Italian neo-fascist terrorist group, the Movimento Politico Ordine Nuovo (MPON: New Order Political Movement), who hatched a plot in the early 1970s to contaminate Roman reservoirs with radioactive materials. See Gianni Flamini, *Il partito del golpe: Le strategie della tensione e del terrore dal primo centrosinistra organico al sequestro Moro* (Ferrara: Bovolenta, 1981-1985), volume 2, [actual pagination unavailable, since Bale’s copy of this volume is presently in a storage locker in another city]. There is also another interesting case in Chile in which Eugenio Berríos, a military officer working for the Dirección de Inteligencia Nacional (DINA: Directorate of National Intelligence), the Chilean secret police, was reportedly manufacturing sarin at a DINA “safe house” then frequented by Italian neo-fascist terrorist Stefano delle Chiaie, the historic leader of Avanguardia Nazionale (AN: National Vanguard), and American DINA operative Michael Townley, who was later implicated in the Washington, DC Embassy Row assassination of Orlando Letelier, a former official in Salvador Allende’s government. See Samuel Blixen, *El vientre del Cóndor: Del archivo del terror al caso Berríos* (Montevideo: Brecha, 1994), p. 25.

“beyond the pale,” whether for principled moral reasons or because their negative effects could far outweigh whatever tangible benefits the group might hope to gain from carrying them out. WMD terrorism appears to have fallen into that “beyond the pale” category for most such groups, irrespective of their level of technical competence. This is because they tend to have a rational understanding of cause-and-effect relationships, more limited immediate political objectives, and an acute sensitivity to the impact of their actions on outside observers, however Manichean their worldviews or utopian their ultimate political goals may be. It is also the case that up until the 1980s few terrorist groups seem to have had sufficient technical knowledge or the type of specialized equipment required to initiate a successful WMD attack, even if they had wished to do so.

As far as the “new” religious terrorists are concerned, sometimes similar and at other times radically different factors seem to have been involved in inhibiting their deployment of WMD thus far. Before turning to this complicated matter, one important conceptual point needs to be emphasized once again: not all violence-prone non-state religious groups – or, for that matter, their secular counterparts – can technically be described as terrorists in the strict sense of the term, since their acts of violence are not necessarily, and perhaps not even typically, intended to influence one or more target audiences. Indeed, some analysts have suggested that religious terrorists “seek to appeal to no other constituency than themselves,” whereas others have instead argued that, rather than the particular group to which they belong, the primary “constituency” of violent religious groups is the god(s) they choose to worship and are seeking the favor of.⁵⁵ If particular religious groups carry out their violent actions solely in order to kill others, meet the solipsistic emotional needs of their own members, or only to please other-worldly deities, without regard to the effects of those actions on wider human audiences, they should not be described as terrorists at all, strictly speaking. Such groups, given their seeming lack of concern about the psychological and practical effects of their actions in the profane world, are likely to be particularly dangerous because they are more or less unconstrained by external forces.⁵⁶

Fortunately, most religious groups are at least partially concerned with events on the terrestrial plane,⁵⁷ and some may be as sensitive to the effects of their actions on wider audiences as secular terrorists. It is clear, for example, that a significant number of Islamist terrorists seek to convert other, less committed, Muslims to their own radical brand of Islam in the hopes of eventually recruiting new cohorts of dedicated fighters. In certain contexts, this has probably caused them to avoid carrying out various “beyond the pale” actions that would be likely to alienate a huge potential source of recruits. If, on the other hand, they fail to take cognizance of the alienating effects of their own actions, even on potential supporters, there are usually negative

⁵⁵ Bruce Hoffman, *Inside Terrorism* (New York: Columbia University, 1998), p. 95; Brian M Jenkins, “Understanding the Link between Motives and Methods,” in *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses* (Alexandria, VA: Chemical and Biological Arms Control Institute, 1997), p. 48.

⁵⁶ Indeed, Jackson argues (“Technology Acquisition by Terrorist Groups,” p. 190) that a group “seeking maximal destruction for the benefit of a divine audience would likely conclude [that highly destructive chemical or biological] weapons would be appropriate to their goals.”

⁵⁷ Compare John V. Parachini, “Comparing Motives and Outcomes of Mass Casualty Terrorism involving Conventional and Unconventional Weapons,” *Studies in Conflict and Terrorism* 24:5 (September 2001), p. 399, who points out that since “there is some evidence that some of the perpetrators of mass casualty violence do mix religion with other motivations, the charge that the new terrorism is predominantly religiously inspired overstates the case.” To illustrate this point, he cites the case of 1993 World Trade Center bombmaker Ramzi Yusuf, whose lack of religiosity was “conspicuous.” See *ibid*, pp. 391-2.

consequences. One excellent illustration of this can be observed in Algeria, where certain Islamist terrorists became so appalled by the Groupe Islamique Armé's (GIA) systematic carrying out of counterproductive atrocities that they broke away from that organization, formed their own rival group, the Groupe Salafiste pour la Prédication et le Combat (GSFC), and thence forged an alliance with al-Qa`ida.⁵⁸

In any event, the general consensus among experts seems to be that, given their sectarian religious worldviews, religious terrorists are more willing – and therefore likely – to violate traditional moral taboos against the use of CBRN weapons than their secular counterparts.⁵⁹ As Bale has expressed it elsewhere, “to the extent that violent extremist groups are absolutely convinced that they are doing God’s bidding, virtually any action that they decide to undertake can be justified, no matter how heinous, since the ‘divine’ ends are thought to justify the means.”⁶⁰ This certainly does not mean, however, that every violence-prone group within the “religious” category is equally prone to perpetrate mass casualty terrorism or have recourse to CBRN weapons. On the contrary, many analysts have rightly emphasized the importance of recognizing key theological, historical, and cultural distinctions, not only between different religious traditions but also between diverse and often sectarian groups within those broader traditions.⁶¹ For example, Gressang warns that

⁵⁸ See, e.g., Rohan Gunaratna, *Inside Al Qaeda: Global Network of Terror* (New York: Berkley, 2003), pp. 183-6; and the more nuanced summary of Jason Burke, *Al-Qaeda: Casting a Shadow of Terror* (London: I. B. Tauris, 2003), pp. 194-8.

⁵⁹ Hoffman, *Inside Terrorism*, p. 94; idem, “Terrorism and WMD: Some Preliminary Hypotheses,” *Nonproliferation Review* 4:3 (Spring-Summer 1997), pp. 45-50; idem, “Holy Terror”: *The Implications of Terrorism Motivated by a Religious Imperative* (Santa Monica: RAND, 1993); Cameron, “WMD Terrorism in the United States,” pp. 169-70; James K. Campbell, “On Not Understanding the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. by Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), pp. 30-3; Gurr and Cole, *New Face of Terrorism*, pp. 22-32, 126-48; Tucker, “Lessons from the Case Studies,” in *Toxic Terror*, pp. 261-2; and Marlo, “WMD Terrorism and US Intelligence Collection,” p. 55. One of the first studies to emphasize the greater CBRN dangers posed by religious terrorists in general and by cults in particular is that of David F. Ronfeldt and William Sater, *The Mindsets of High-Technology Terrorists: Future Implications from an Historical Analog* (Santa Monica: RAND, 1981). For both sides of the issue, see the heated debate between Falkenrath, “Confronting Nuclear, Biological and Chemical Terrorism,” pp. 56-7; Pilat, in his segment from “WMD Terrorism: An Exchange,” pp. 172-3, wherein Falkenrath’s supposed depiction of religious terrorists as “unconstrained mass killers” is described as a “caricature”; and Falkenrath’s reply in *ibid*, p. 181.

⁶⁰ Bale, “Islamism,” in *Encyclopedia of Bioterrorism Defense*, ed. by Richard F. Pilch and Raymond Zilinskas (New York: Wiley, 2004), forthcoming. Compare Hoffman, “Holy Terror”, p. 12.

⁶¹ See Gressang, “Audience and Message,” pp. 100-2, who among other things distinguishes between religious groups that are essentially calling for political and social change, despite their overheated theological rhetoric, and those who “call for destruction as a necessary precondition for achieving [their] objectives.” For his part, Mark Juergensmeyer has sought to distinguish between “ethnic religious nationalism” and “ideological religious nationalism”: the former “politicizes religion by employing religious identities for political ends,” whereas the latter “religionizes politics [by putting] political issues and struggles within a sacred context.” See “The Worldwide Rise of Religious Nationalism,” *Journal of International Affairs* 50:1 (Summer 1996), p. 5. Many other more or less subtle distinctions can and have been made between different types of religious groups and their motivations. For an excellent example of the value of adopting a historically-grounded contextual approach to violent religious groups, see Rapoport, “Fear and Trembling,” which deals with three notorious pre-modern terrorist groups from entirely different religious traditions.

[t]he notion that a religious imperative offers a greater propensity for violence and a greater likelihood of WMD use is problematic, since religious motivation explanations may not explore the dynamic in sufficient depth. The resulting danger lies in the potential to overgeneralize and stereotype motivations. Emphasizing the religious imperative could also lead to the unintended incorporation of biases against differing religious orientations. We [might] assume the worst...based more on our interpretations of the group's core beliefs than their motives and outcome expectations.⁶²

Other specialists have openly challenged this entire idea, in part because the historical record indicates that most of the previous CBRN terrorist plots were hatched by non-religious groups and in part because they view both secular terrorists and religious terrorists as equally rational actors.⁶³ However, we remain convinced that in the future religious terrorists are more likely to deploy such weapons than terrorists adhering to secular belief systems, no matter how radical these latter may be.

However, as has just been pointed out, this general assessment clearly needs to be qualified further. Certain types of religious groups seem to be much more prone than others to carry out acts of catastrophic violence, with or without the use of WMD. In some cases this is mainly attributable to the content of their religious worldviews, whereas in others it is primarily a result of the authoritarian internal structures or dynamics of the group itself. In still other cases it is a product of both.

As far as religious beliefs are concerned, groups motivated by apocalyptic millenarian religious doctrines seem to be particularly dangerous, since such doctrines postulate 1) the imminent destruction of the existing world order, which is viewed as thoroughly and irremediably "evil"; 2) a terrible fate for the majority of immoral, unenlightened people; 3) the playing of a key role by a select group of very special people – the true followers of the doctrine, namely, themselves – who will thus be spared the tragic fate of others; and 4) that the collapse of the existing order will usher in an "earthly paradise," created by and for those same special people, which will be free of want, hardship, suffering, strife, oppression, immorality, and everything else that is "evil."⁶⁴ The adherents of doctrines such as this, except in cases where they are persuaded to passively await the fulfillment of prophecy instead of taking any precipitant actions, may well be motivated to hasten the coming destruction of the existing world by carrying out extreme acts of violence

⁶² "Audience and Message, p. 88.

⁶³ See especially David C. Rapoport, "Terrorism and Weapons of the Apocalypse," *National Security Studies Quarterly* 6:3 (Summer 1999), pp. 49-67. Compare also Adam Dolnik, "All God's Poisons: Re-evaluating the Threat of Religious Terrorism with Respect to Non-conventional Weapons," CNS report prepared in 2003 for a U.S. government agency. This study has recently been published in *Terrorism and Counterterrorism: Understanding the New Security Environment*, ed. by Russell D. Howard and Reid L. Sawyer (Guilford, CT: McGraw-Hill, 2004). Both of the assumptions upon which this argument downplaying religious fanaticism is based, however useful as a corrective to consensus thinking, seem to us to be flawed or, at the very least, exaggerated.

⁶⁴ Ted Daniels, ed., *A Doomsday Reader: Prophets, Predictors, and Hucksters of Salvation* (New York: New York University, 1999), p. 2. For the definitive historical analysis of apocalyptic millenarianism, see Norman Cohn, *The Pursuit of the Millennium: Revolutionary Millenarians and Mystical Anarchists of the Middle Ages* (New York: Oxford University, 1990).

against the “satanic” forces that now rule it. This was certainly the case with groups such as Aum Shinrikyo and the Covenant, the Sword, and the Arm of the Lord.⁶⁵

Second, religious communities whose members believe that they will absolve themselves of all their prior sins and immediately ascend to a heavenly paradise if they sacrifice themselves for their gods are also prone to carry out acts of extreme violence. This can easily lead to the commission of horrific acts of purifying violence, including “suicide” bombings, that the protagonists believe will lead to a full atonement for their earthly sins and the other-worldly rewards that follow therefrom. In the present era, for example, the absolute conviction that dying whilst waging *jihad* against infidels or apostates will result at once in ascension to Paradise, as opposed to spending time in the Muslim equivalent of Purgatory, has motivated dedicated members of both Sunni and Shi’a Islamist groups to carry out martyrdom operations. In other cases, however, the violence of the believers may instead be turned inward rather than directed outward against external enemies, as in the case of Heaven’s Gate.⁶⁶

On the other hand, religious organizations that are firmly ensconced within an exposed, vulnerable piece of territory or actively engaged in a broader array of conventional political activities are probably less likely to risk their own complete destruction by carrying out an attack that would be likely to precipitate the most extreme forms of retaliation. However fanatical some of their cadre may be, it would be extremely risky for established Islamist groups like Hizballah, HAMAS, and al-Jihad al-Islami to engage in WMD attacks, whether against Israel or the United States, since their entire lands could conceivably be occupied or physically destroyed in response.⁶⁷ In short, it may well be possible to deter such groups from carrying out WMD attacks

⁶⁵ For the doctrinal motivations of these two groups, see Ian Reader, *Religious Violence in Contemporary Japan: The Case of Aum Shinrikyo* (Honolulu: University of Hawaii, 2000); Manabu Watanabe, “Religion and Violence in Japan Today: A Chronological and Doctrinal Analysis of Aum Shinrikyo,” *Terrorism and Political Violence* 10:4 (Winter 1998), pp. 80-100; and Kerry Noble, *Tabernacle of Hate: Why They Bombed Oklahoma City* (Prescott, Ontario: Voyageur, 1998), a revealing insider account of the CSA. Perhaps not surprisingly, both groups planned and/or attempted to employ CBRN weapons against their “evil” enemies. See David E. Kaplan, “Aum Shinrikyo (1995),” in *Toxic Terror*, pp. 207-26; Milton Leitenberg, “Aum Shinrikyo’s Efforts to Produce Biological Weapons: A Case Study in the Serial Propagation of Misinformation,” *Terrorism and Political Violence* 11:4 (Winter 1999), pp. 149-58; and Jessica Eve Stern, “The Covenant, the Sword, and the Arm of the Lord (1985),” in *Toxic Terror*, pp. 139-57. Yet it is also the case that Aum’s CB attacks were normally carried out for surprisingly practical reasons, e.g., to eliminate external critics or former members, test delivery methods, and divert the attention of the authorities once a police crackdown on the group seemed imminent. Compare Schmid, “Chemical Terrorism,” electronic p. 3; Marlo, “WMD Terrorism and US Intelligence Collection,” p. 56; and Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” p. 28.

⁶⁶ Sometimes the mass deaths of adherents of the People’s Temple and Ordre du Temple Solaire (OTS: Order of the Solar Temple) are misleadingly placed in this same category, but in both of those cases several group members were murdered outright and others were then forced, reportedly at gunpoint, to “commit suicide.” For an excellent introduction to the OTS, see Jon R. Hall and Philip D. Schuyler, “The Mystical Apocalypse of the Solar Temple,” in *Apocalypse Observed: Religious Movements and Violence in North America, Europe, and Japan*, ed. by idem (London and New York: Routledge, 2000), pp. 111-48. We have yet to run across an analysis of Jim Jones’ group that we consider entirely satisfactory.

⁶⁷ Although Hizballah did in fact carry out several mass casualty terrorist attacks against Western embassies and military bases inside Lebanon in the 1980s, which might easily have provoked a harsh retaliation, those attacks were made during an earlier phase of the organization’s development, when it was still largely a client group of the Pasdaran (Guardians [of the Iranian Revolution]) Corps. The more thoroughly that

against democratic states in the same way that “rogue regimes” occupying a fixed territory can be deterred from doing so. (This may be the only advantage to be gained by better integrating them into the political party systems of their respective countries – provided that the electoral result is not “one man, one vote, one time.”) However, this situation could quickly change if such groups felt that the time to launch a global jihad had arrived, that there was no possible way to achieve their goals using conventional measures, or that their very existence was threatened.

Moreover, these same restraining factors do not apply to certain other types of religious groups. First and foremost among these are transnational Islamist groups like al-Qa`ida, which are spread all over the globe and do not depend for their survival on their continued occupation or control of specific territories. This seems to be borne out by the fact that in recent years several leaders of al-Qa`ida and its affiliated groups have openly boasted of their intent to acquire and deploy such weapons. For example, Bin Ladin himself has stated that acquiring weapons of all types, including CBRN, is a Muslim “religious duty.”⁶⁸

A second major category of religious (or, for that matter, political) organizations that are unlikely to be restrained by environmental factors are insular cult-like groups which seem to act almost entirely on the basis of their own internal imperatives.⁶⁹ Although such groups typically view

Hizballah is integrated into mainstream Lebanese politics, the less likely it may be to carry out these types of attacks in the future, whether inside or outside of Lebanon.

⁶⁸ *Time*, December 24, 1998, transcript of interview with ‘Usama bin Ladin. For specific allegations concerning al-Qa`ida’s purported acquisition of various types of CBRN, most of which have not been substantiated, see the chart compiled by Kimberly McCloud et al, “Al-Qa`ida’s WMD Activities,” CNS website: cns.miis.edu/pubs/other/sjm_cht.htm.

⁶⁹ Nowadays, the use of the term “cult” is the subject of bitter controversy among scholars in the field of Religious Studies, in part because it has all too often been applied in an imprecise or partisan fashion. The best introduction to the polarizing controversies in this field is provided by Benjamin Zablocki and Thomas Robbins, eds., *Misunderstanding Cults: Searching for Objectivity in a Controversial Field* (Toronto: University of Toronto, 2001). In order to avoid unnecessary terminological confusion, a “religious cult” can be defined, in the strict sense of the term, as a New Religious Movement (NRM) which systematically employs well-known techniques of coercive persuasion, irrespective of the precise nature of its theological doctrines.

When it comes to assessing whether particular small-scale social organizations, non-mainstream or otherwise, are bona fide cults, or whether they merely display certain cult-like features, all one needs to do is pay careful attention to their internal social control mechanisms and authority structures. This is not all that hard to do as long as one remains skeptical about the claims of leaders and true believers, is allowed to conduct fieldwork or at least observe the group for a time, is able to obtain detailed inside information from present and former members, and knows what telltale signs to look for. The following can all be viewed as warning signs of coercive persuasion:

- a) selective recruitment of psychologically vulnerable targets
- b) initial deception concerning group affiliation and purposes
- c) application of extreme and often degrading forms of peer group pressure, including forced public “confessions”
- d) ongoing isolation from mainstream society (especially relatives and friends) at retreats
- e) sensory overload
- f) sleep and protein deprivation
- g) constant surveillance or enforced lack of privacy
- h) exploitation of labor (12-16 hour work days)
- i) confiscation of personal assets
- j) intense ideological indoctrination

certain external occurrences as signs and portents of future cosmic events that have been foretold by their leaders, and are likely to become even more paranoid and apocalyptic in response to any sign of hostility from mainstream society or repressive actions taken by the state, their actions often seem ultimately to be the products of a combination of idiosyncratic theological conceptions and authoritarian intragroup dynamics that may have little or nothing to do with specific developments in the outside world. Hence it should come as no surprise to discover that these types of groups are often responsible for carrying out sudden acts of horrific violence that seem to be triggered primarily by internal processes or mechanisms. Such was apparently the case with the *Ordre du Temple Solaire* (OTS: Order of the Solar Temple) in Switzerland and Quebec and the Movement for the Restoration of the Ten Commandments of God in Uganda.

In sum, there is not necessarily any direct correlation between religious extremism and a particular terrorist group's decision to employ WMD, much less any automatic relationship between the two. Many other factors are also undoubtedly involved, so the most that can be said is that under certain circumstances religious extremism can be a very important contributory factor in permitting a group to rationalize its acquisition, development, or use of CBRN agents.

Moreover, there are also other types of extremist groups that might also be attracted to using CBRN materials. Some analysts have singled out groups bent on revenge, assorted right-wing extremists, ad hoc groups of like-minded people, and disturbed lone individuals as being especially prone to adopt such weapons, though in truth this is largely speculation on the basis of a handful of cases.⁷⁰ Furthermore, terrorist organizations with scientific and technological pretensions or fetishes might be more apt to employ high-tech weapons, including CBRN, assuming that they were actually able to acquire or develop them. (In this context, cult groups with worldviews inspired by science fiction motifs, including the Church of Scientology and the Raëlians, perhaps warrant special attention, all the more so if they involve genetic engineering or other advanced technologies and techniques.)⁷¹ Whether such a techno-fetish is the product of a secular or religious ideology may or may not turn out to be particularly relevant.

k) sexual exploitation

l) physical abuse and imprisonment

m) authoritarian forms of charismatic leadership

Religious, therapeutic, political, or hybrid groups that possess all or most of these characteristics can legitimately be categorized as thought reform cults, whereas those that exhibit only a few of these traits can perhaps best be described as "cult-like" or potentially "cultic." To portray religious groups with these characteristics as nothing more than "harmless" alternative religions and "innocent" victims of religious persecution defies all logic. The above remarks originally appeared in Jeffrey M. Bale, "The Cult Wars, Part I," *Hit List 2:4* (January-February 2001). One of the few works devoted exclusively to "political cults" is that of Dennis Tourish and Tim Wohlforth, *On the Edge: Political Cults Right and Left* (Armonk, NY: M. E. Sharpe, 2000). Unfortunately, the analysis therein is rather superficial. For two insider accounts of political cults, see Alexandra Stein, *Inside Out: A Memoir of Entering and Breaking Out of a Minneapolis Political Cult* (St. Cloud, MN: North Star, 2002); and Janja Lalich, *Bounded Choice: True Believers and Charismatic Cults* (Berkeley: University of California, 2004).

⁷⁰ Tucker and Sands, "An Unlikely Threat," p. ; Falkenrath et al, *America's Achilles' Heal*, pp. 194-202.

⁷¹ For Scientology, see Roy Wallis, *The Road to Total Freedom: A Sociological Analysis of Scientology* (New York: Columbia University, 1977); Jon Atack, *A Piece of Blue Sky: Scientology, Dianetics, and L. Ron Hubbard Exposed* (New York: Carroll, 1990); J. Gordon Melton, *The Church of Scientology* (Salt Lake City: Signature/CESNUR, 2000); James R. Lewis, *Scientology: Religious Consciousness in a Technological Age* (New York: Garland, 1991); Bent Corydon, *L. Ron Hubbard: Messiah or Madman?* (Fort Lee, NJ: Barricade, 1996); Russell Miller, *Bare-Faced*

Finally, there appear to be other warning signs that particular terrorist groups, irrespective of their specific ideologies, might at some point be inclined to produce or deploy WMD. Some of these are organizational in nature, some behavioral. If we combine the insights of James K. Campbell and Jonathan Tucker, for instance, all of the following characteristics may be viewed as potential indicators of a terrorist group's propensity to employ such materials:⁷²

- 1) those directed by sadistic, megalomaniacal, or delusional but nonetheless charismatic and authoritarian leaders;
- 2) those that are socially isolated, do not seriously aim to appeal to – much less claim to represent – a broader constituency, and are thus relatively unconcerned about the negative “blowback” resulting from their actions;
- 3) those that insistently urge their members and supporters to carry out unrestrained violence against demonized and dehumanized collective enemies;
- 4) those whose actual levels of violence have been progressively escalating over time;
- 5) those that have consistently displayed innovation in their use of weapons and/or tactics, or at least a willingness to take higher-than-normal risks;⁷³
- 6) those that go out of their way to recruit people with relatively advanced technical or scientific skills;
- 7) those with sufficient financial resources to subsidize the acquisition or development of CBRN weapons;
- 8) those that have relatively easy access to WMD-related materials; and
- 9) those (with sufficient technical means) which are in such desperate straits, real or imagined, that they come to feel they have nothing left to lose by employing every means at their disposal to smite their hated enemies.⁷⁴

Needless to say, terrorist groups that display several of the above characteristics are particularly worrisome in this context.

Given that several categories of subnational groups have just been flagged as being particularly prone to carry out attacks using WMD or at least to engage in smaller-scale CBRN attacks, the obvious question is why so few such attacks have been carried out up until now. The rarity of such attacks is understandable, especially catastrophic mass casualty attacks that are very difficult to organize and execute, but this same rarity is also characteristic for cruder, small-scale CBR attacks, which almost any reasonably professional terrorist group could likely carry out if it

Messiah: The True Story of L. Ron Hubbard (New York: H. Holt, 1988); and Robert Kaufman, *Inside Scientology: How I Joined Scientology and Became Superhuman* (New York: Olympia, 1972). Of particular interest is the well-researched monograph that exposes the covert activities of the Church of Scientology's special operations unit, “Scientology's Secret Service: Inside Scientology's Intelligence Agencies,” available at <http://www.xs4all.nl/~kspaink/cos/SecrServ/go.htm>. For the Raëlians, see especially Susan J. Palmer, *Aliens Adored: Raël's UFO Religion* (New Brunswick: Rutgers University, 2004). Compare also George D Chryssides, “Scientific Creationism: A Study of the Raëlian Church,” in *UFO Religions*, ed. by Christopher Partridge (London and New York: Routledge, 2003), pp. 45-61. In the Raëlian case, however, it seems likely that the group's essentially hedonistic orientation will serve to impede its eventual resort to apocalyptic violence.

⁷² Compare Campbell, “On Not Understanding the Problem,” pp. 35-9; and Tucker, “Lessons from the Case Studies,” in *Toxic Terror*, pp. 255-63.

⁷³ Jackson, “Technology Acquisition by Terrorist Groups,” p. 203.

⁷⁴ Sprinzak, “On Not Overstating the Problem,” in *Hype or Reality?*, p. 6.

was really determined to do so. Several analysts have explained this by claiming that terrorists, whatever their ideological predispositions, tend to be “conservative” in terms of their adoption of new techniques and new technologies.⁷⁵ Even if this claim is true, which is arguable, external pressures to carry out ever more spectacular attacks so as to obtain publicity or display their prowess, a perceived need to adopt new trends and precedents that have already been set by other and perhaps even rival groups, or a desire to “mimic” states that have launched successful attacks may all cause normally reticent groups to take risks and make a qualitative leap in their tactical or technical arsenals.⁷⁶

One point that surely needs to be emphasized is that the operational methods, tactics, and weapons used by terrorists in the past cannot, in and of themselves, allow us to predict their future behavior with any certainty. At best they can only provide us with general guidelines – specifically, some indications of the multiplicity of factors that may end up influencing the choice of particular tactics and weapons by today’s terrorist groups. As Sprinzak has noted, it would be advisable to carry out a systematic study of the “psycho-political” reasons why former terrorists adopted certain weapons and tactics rather than others, especially the members of groups which considered but eventually rejected the use of WMD.⁷⁷ However, even if the motives that earlier generations of terrorists had for adopting certain types of unconventional or innovative weapons were better understood, this would not necessarily allow us to predict the future use of CBRN weapons by particular groups with any certainty. As the history of warfare has repeatedly demonstrated, weapons and tactics often undergo a very gradual process of development over a long period of time before being suddenly and unexpectedly transformed, sometimes for reasons that make little or no apparent military sense, except perhaps in hindsight. For example, as late as 1400 very few observers could have predicted the coming substitution of highly efficient missile weapons such as composite recurve bows, which had been used for centuries by some of the world’s most formidable military forces, by clumsy, primitive, and seemingly ineffective hand-held firearms. Such forecasting problems are both compounded and temporally compressed in our current era of rapid technological change.

In short, it is very hard to explain why particular terrorist groups might decide to adopt – or not adopt – new weapons and tactics, at least without inserting informants into their ranks or interrogating captured group members. It is harder still to determine why so few have previously carried out even crude CBR terrorist attacks, especially given that such attacks are not only relatively easy to launch but would also be likely to exert a much more profound impact on the psychological states of target audiences than conventional terrorist attacks.

There seem to be three main motivational reasons why these types of low-grade but nonetheless fear-inducing attacks have been relatively rare. First, many subnational groups still probably seek to avoid crossing the CBRN threshold because they are concerned about alienating the sympathies of their proclaimed constituents or their potential international supporters. Only the most fanatical, insular, solipsistic, or desperate extremists will fail to concern themselves with, or take cognizance of, the broader negative impact that their violent actions are likely to have.

⁷⁵ See, e.g., Brian Jenkins, “Defense Against Terrorism,” *Political Science Quarterly* 101:5 (1986), p. 777; Bruce Hoffman, “Terrorist Targeting: Tactics, Trends, and Potentialities,” *Terrorism and Political Violence* 5:2 (Summer 1993), pp. 13-14; and Richard Clutterbuck, “Trends in Terrorist Weaponry,” *ibid*, pp. 130-9;

⁷⁶ Falkenrath et al, *America’s Achilles’ Heal*, pp. 207-13.

⁷⁷ Sprinzak, “On Not Overstating the Problem,” pp. 14-15.

Fortunately, not many existing groups fall into this wholly “expressive” or perhaps other-worldly category, as opposed to the primarily “instrumental” and this-worldly category. Nor are they likely to in the future.

Second, conventional terrorist weapons such as military grade explosives are likely to do far more damage, both to human beings and to property, than primitive CBR attacks in which low-grade toxic materials are used or higher-grade materials are improperly disseminated. Why, in the final analysis, should terrorist groups risk experimenting with dangerous, new-fangled substances instead of relying upon the tried and true conventional methods of destruction that they are already intimately familiar with? As long as these methods continue to be effective, there will be little incentive for most such organizations to adopt more exotic and unpredictable techniques or technologies. Indeed, although it may well be rash to describe most terrorists as “conservative” in their methods, only a few rather peculiar extremist groups are likely to be radically innovative. According to Jackson, those that are “most likely to pursue and successfully deploy new technologies” are “tapped into new technology options, open and hungry for new ideas, willing to take risks, not afraid to fail, and driven by [their] environment to pursue novelty.”⁷⁸ If they have access to necessary human and financial resources, collaborative relations with outsiders who have both tacit and explicit knowledge, and enough time to experiment with different techniques and technologies, then their “technology adoption efforts are likely to be successful.”⁷⁹

Third, the very same fears about the horrific effects of CBRN that beset the general populace tend to be shared by members of terrorist groups who likewise lack enough specialized scientific knowledge to be able to distinguish between CBRN realities and their own paranoid fears. Irrational phobias about possible contamination, infection, and disease are common to scientific laymen throughout the world, including terrorists themselves.⁸⁰ Hence, only the most dedicated fanatics would probably be willing to risk dying slowly and painfully after inadvertently contracting an exotic incurable disease, being contaminated by high doses of radiation, or otherwise being exposed to an unseen toxin, especially after witnessing their gruesome effects on television after actual outbreaks of hemorrhagic fever, or even after seeing frightening fictional films about outbreaks of plague. Suicide bombers are also much more likely to prefer going out with a sudden, painless, glorious bang rather than a lingering, painful, inglorious whimper.⁸¹ And even assuming that a few actually volunteered to serve as “human guinea pigs” in this way, no one else is likely to want to follow in the footsteps of self-styled “martyrs” who are observed dying a horrible death after being willingly infected with, say, smallpox.

Unfortunately, all three of these restraining factors may now be gradually breaking down. As noted above, certain “new” categories of terrorists are seemingly less concerned about local or world opinion than their traditional counterparts, and the bigger psychological payoff that would surely result from even a small-scale CBR attack may increasingly appeal to today’s terrorists, especially after having witnessed the panic that ensued in the wake of Aum Shinrikyo’s 1995

⁷⁸ “Technology Acquisition by Terrorist Groups,” p. 203. For a fuller discussion, see *ibid*, pp. 188-203.

⁷⁹ *Ibid*, p. 203.

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⁸¹ See Adam Dolnik, “Die and Let Die: Exploring Links between Suicide Terrorism and Terrorist Use of Chemical, Biological, Radiological, and Nuclear Weapons,” *Studies in Conflict and Terrorism* 26:1 (January-February 2003), p. 30.

sarin attack in Tokyo and, more recently, the 2001 *B. anthracis* letter mailings. Finally, greater and greater levels of scientific and technological literacy may over time lead to the attenuation of extreme fears of inadvertent contamination whilst handling CBRN materials among terrorists themselves, thereby increasing the likelihood that they would be willing to assume the attendant risks involved in carrying out such attacks.

Chapter 3: Terrorist Capabilities for Using WMD*

Summary of Chapter:

Whilst the discussion of terrorist capabilities for conventional terrorism centers mostly on such factors as a group's training, financing, and communications capabilities, in the context of WMD terrorism the focus is squarely on the weapons themselves and the terrorists' capacity for acquiring and using them.

The debate tends to break down into three basic questions, and the answers to these questions are situated along a continuum, ranging from highly unlikely to extremely probable, concerning whether terrorists will be able to attain a WMD capability:

- 1) do terrorists currently have the capability to engage in true WMD attacks?
- 2) is the capability of terrorists with regard to WMD increasing?
- 3) if terrorists' WMD capabilities are increasing, what is the rate of this change?

The only discernible area of agreement between analysts seems to be that there exists at least a minimal possibility that a technologically and organizationally adept terrorist organization will succeed in acquiring a CBRN weapon capable of causing mass casualties, and that a nuclear weapons capability is the most difficult to achieve. Several believe that the WMD capabilities of terrorists are improving, and that the rate of improvement is also increasing.

Two broad trends are relevant in this context. First, terrorist capabilities in terms of tactics, logistics, and tools are generally increasing. Second, broader societal changes (e.g., increasing population densities, dependence on infrastructure networks, and the freedoms of Western democracies) are making societies more vulnerable to terrorism.

The factors contributing to the terrorist acquisition and use of WMD are:

Organizational Capabilities: Factors such as group size, mechanisms of leadership, degree of centralization of authority, internal dynamics, and the ability to adopt new technology hamper or facilitate a group's acquisition of WMD.

Logistical Resources: Merely having technical expertise, good management and copious funding is probably insufficient to succeed in a WMD attack. The group's WMD activities need to be supported by an efficient logistical backbone, including adequate transportation and communications.

Financial Resources: It appears that a certain level of finances is a necessary but not sufficient condition for developing a WMD. Even though presence of large financial resources will not guarantee a capability to acquire and use WMD, it will certainly help the terrorist group to bypass several hurdles in the process.

* This chapter was written primarily by Gary Ackerman.

Knowledge/Skill Acquisition: A necessary element of a WMD capability is the technical knowledge and skills required to produce and deploy a large-scale chemical, biological, radiological or nuclear weapon. Such a skill can be acquired via a) the indigenous development of knowledge and skills within the group; or b) the obtaining of the necessary skills from personnel from outside the group. Whichever route a group takes to acquire the relevant knowledge/skill set, it must be borne in mind that technological learning consists of the transfer of both *explicit knowledge* and *tacit knowledge*.

Materials and Technology Acquisition: Most researchers regard chemical weapons precursors as the most easily attainable WMD raw materials, and fissile materials as the most difficult. Radiological materials and biological seed stocks are placed in the middle. It is nearly impossible for a terrorist organization to produce its own fissile material, forcing them to steal it or procure it illicitly or obtain an intact nuclear device. By contrast, the dual-use nature of the active ingredients of CBR weapons makes them much more common.

Initial Production of Agent: All of the types of WMD are deemed to be within the production capacity of well-equipped, well-organized, and highly motivated terrorist groups. Again, nuclear weapons are deemed among the most difficult, whereas the level of difficulty involved in producing chemical and biological weapons is dependent on the agent in question.

Weaponization of Agent: This is considered by many experts to be the most difficult factor in developing a WMD capability. The effectiveness of many CBRN agents is primarily dependent upon their mode of delivery. There have been many more instances of terrorist acquisition of CBRN than instances of effective delivery, and still fewer with mass-casualty potential. In general, chemical agents are deemed the easiest to weaponize and deliver, biological agents the hardest.

Two additional factors need to be considered in any analysis of CBRN terrorism. First, state sponsorship of terrorism will reduce most of the aforementioned technical hurdles, so prudent analysts should not dismiss this possibility. Second, terrorists might attack certain facilities like nuclear reactors and chemical plants, even though such attacks cannot be classified as attacks using WMD in the strict sense. Such attacks are not only within the realm of possibility, but are also within the reach of almost any well-organized and operationally effective terrorist group.

Body of Chapter:

Introduction

While the purpose of this report is partly to highlight the importance of including terrorist motivations in any assessment of the WMD terrorism threat, an understanding of terrorist capabilities in this context is an equally crucial element in understanding WMD terrorism. It is in the consideration of terrorist capabilities for engaging in WMD terrorism that one sees perhaps the greatest departure from traditional terrorism analysis. While the discussion of terrorist capabilities for conventional terrorism centers mostly on such factors as a group's training, financing, and communications capabilities (with most analysts taking for granted that terrorists have access to a variety of small arms and explosives), in the context of WMD terrorism the focus is squarely on the weapons themselves and the terrorists' capacity for acquiring and using them.

Regarding the capability of terrorists to engage in true WMD attacks (as defined in Chapter 1⁸²), the majority of the debate can be broken down into three basic questions:

- 4) Do terrorists currently have the capability to engage in true WMD attacks?
- 5) Is the capability of terrorists with regard to WMD increasing?
- 6) If terrorists' WMD capabilities are increasing, what is the rate of this change?

The answers that the literature provides to these questions (as well as those relating to motivation) are not binary "yes" or "no" determinations. Almost every author couches his or her conclusions in conditionality, and hardly any either definitively reject the possibility of WMD terrorism or propound its inevitability. The expert opinions in the literature can therefore be situated along a continuum representing the likelihood that terrorists will attain a WMD capability, ranging from the highly unlikely to the extremely probable.

This section will first discuss the above three questions in a general manner, and then proceed with a more detailed analysis of the various components of capability relevant to WMD terrorism.

Do terrorists currently have the capability to engage in true WMD attacks?

Several authors contend that previous technical obstacles to obtaining or developing WMD have eroded, and that a WMD capability is most likely within the reach of at least a certain subset of terrorist groups.⁸³ The group most commonly cited as being likely to "overcome the technical, organizational and logistical obstacles to WMD"⁸⁴ is the al-Qa`ida network, which is reported to be pursuing several types of WMD⁸⁵. Other commentators are more sanguine about current terrorist capabilities, believing that they have been exaggerated and that technical hurdles still prevent terrorists from engaging in anything more than small to medium-sized attacks using CBRN weapons (which would not constitute true WMD events).⁸⁶ Then there are those who take

⁸² While this study focuses on high-impact CBRN attacks, it must not be forgotten that even small-scale or minimally effective CBRN attacks can have large psychological and social effects, which may be all that is desired by some terrorist groups. As Cordesman maintains, "As is the case with chemical and biological weapons, public and world perceptions of the impact of such [nuclear] attacks would initially be based on *the fact that they occurred at all.*" [Emphasis added] Anthony H. Cordesman, "Defending America: Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons," Center for Strategic and International Studies (September 23, 2001), p. 22.

⁸³ See Francis H. Marlo, "WMD Terrorism and US Intelligence Collection," *Terrorism and Political Violence* 11:3 (Autumn 1999), p. 53-71; Ehud Sprinzak, "The Great Superterrorism Scare (Part I)" *Foreign Policy* (Fall 1998), "The Great Superterrorism Scare (Part II)" *Foreign Policy*, Jessica Stern, *The Ultimate Terrorists* (Cambridge, MA: Harvard University Press, 1999), p. 77. Sprinzak, for instance, refers to a 'Capabilities Proposition' that many people are now able to produce these weapons, and states that he largely concurs with this proposition, at least for a limited number of groups.

⁸⁴ Steven Simon and Daniel Benjamin, "America and the New terrorism," *Survival* 42:1 (Spring 2000), p. 8.

⁸⁵ See, for example, Gary A. Ackerman and Jeffrey M. Bale, "Al-Qa`ida and Weapons of Mass Destruction", CNS Research Report, located at <http://www.cns.miis.edu/pubs/other/alqwmd.htm> (accessed September 12, 2004).

⁸⁶ See, for example, Gavin Cameron and Jason Pate, "Covert Biological Weapons Attacks Against Agricultural Targets: Assessing the Impact Against US Agriculture," *Terrorism and Political Violence* 13:39 (Autumn 2001) and Joseph Pilat in Karl-Heinz Kamp, Joseph F. Pilat, Jessica Stern, and Richard A. Falkenrath, "WMD Terrorism: An Exchange," *Survival* 40:4 (Winter 1998-99). Pilat cites Aum as an example of a "technologically capable group" being unable "to produce high purity sarin ..." p. 173.

the middle ground and acknowledge that although many terrorists are now capable in theory of perpetrating a high-level WMD attack, technical barriers form a significant gap between the theoretical possibility and operational reality.⁸⁷ Gurr and Cole, for instance, discuss this debate⁸⁸ and allude to the increasing acquisition of CBRN weapons, but point out that so far “no group has ever acquired an actual ‘WMD’ as this term is traditionally known.”⁸⁹ Yet even the most conservative of these authors do not unequivocally dismiss the prospect of a group currently (or in the near future) being able to field a WMD. Most of the substantive disagreements surrounding this question center on the issue of the technical requirements to produce or deliver WMD, and in many cases presuppose that acquisition of raw materials and logistical requirements can already be easily met.

The above general picture is similar when one looks at estimations of terrorist capabilities across the different types of WMD. In terms of the use by terrorists of nuclear (i.e. fission or fusion) devices, there are those who vehemently deny this possibility, citing the difficulties of acquiring fissile material and constructing a reliable weapon.⁹⁰ More recent analyses in the wake of 9/11, however, tend to be more pessimistic, concluding that the threat of nuclear terrorism (for example, from an improvised nuclear device (IND)) is real.⁹¹ They do not go quite so far as to suggest that extant groups such as al-Qa`ida have actually achieved this capability, but merely state that the possibility cannot be ruled out.⁹²

There is also a fair amount of disagreement regarding radiological weapons such as RDDs (radiological dispersal devices). While the majority of scholars regard the use of a radiological weapon by terrorists as a far more likely proposition than that of a nuclear device,⁹³ there are still those who believe that the technical obstacles to the creation of an effective RDD are remain formidable⁹⁴. Almost all knowledgeable commentators are careful to note, however, that the effects of a radiological weapon will be primarily psychological and economic, with very few

⁸⁷ Bernard Lewis, “License to Kill; Usama bin Ladin’s Declaration of Jihad,” *Foreign Affairs* 77:6 (November/December 1998); Gavin Cameron, “WMD Terrorism in the United States: The Threat and Possible Countermeasures,” *Nonproliferation Review* 7:1 (Spring 2000).

⁸⁸ Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (New York: I. B. Tauris, 2002), p. 18.

⁸⁹ *Ibid*, p. 35.

⁹⁰ Cameron, “WMD Terrorism in the United States,” p.172; Stanley S. Jacobs, “The Nuclear Threat as a Terrorist Option,” *Terrorism and Political Violence* 10:4 (Winter 1998); Kamp et. al., “WMD Terrorism,” p.169.

⁹¹ Annette Schaper, “Nuclear Terrorism: Risk Analysis after 11 September 2001,” *Disarmament Forum*.

Charles D. Ferguson, William Potter, Amy Sands, Leonard Spector and Fred Wehling, *The Four Faces of Nuclear Terrorism* (Monterey, CA: Center for Nonproliferation Studies, 2004).

⁹² David Albright, Cory Hinderstein, and Holly Higgins, “Does Al Qaeda have Nuclear Materials? Doubtful, But,” *Institute for Science and International Security* (March 1, 2002).

⁹³ Stanley S. Jacobs, “The Nuclear Threat as a Terrorist Option,” Charles D. Ferguson, et. al., *Four Faces of Nuclear Terrorism*; Peter D. Zimmerman and Cheryl Loeb, “Dirty Bombs: The Threat Revisited,” *Defense Horizons* 38, Center for Technology and National Security Policy, National Defense University. (January 2004); Charles Ferguson, Tahseen Kazi and Judith Perera, “Commercial Radioactive Sources: Surveying the Security Risks,” Center for Nonproliferation Studies, *Occasional Paper* 11 (January 2003).

⁹⁴ James L. Ford, “Radiological Dispersal Device: Assessing the Transnational Threat,” *Strategic Forum* 136, Institute for National Strategic Studies, National Defense University (March 1998).

immediate physical casualties.⁹⁵ It can be argued therefore, that radiological weapons (as opposed to the nuclear explosive variety) should not be labeled as WMD, but rather as weapons of mass *disruption*, since their maximum potential physical effects are substantially lower than the optimal effects of chemical, biological, or nuclear weapons. Nonetheless, these agents are widely regarded as falling under the rubric of WMD and will therefore be included in the current discussion.

In general discussions of chemical and biological weapons capabilities, these agents are often considered together in the literature.⁹⁶ Here, too, pundits range widely in their estimations. Kamp, although disagreeing in terms of nuclear weapons, concurs with Falkenrath that “if a terrorist organization wanted to inflict mass casualties, it could easily use biological or chemical weapons which . . . are quite simple to acquire or produce.”⁹⁷ Jean-Pascal Zanders takes a more cautious stance, admitting the feasibility of mass-casualty chemical and biological weapons, but emphasizing the difficulties in acquiring these weapons and expressing doubts about the quality of any weapons that are produced.⁹⁸ At the more conservative end of the spectrum, a renowned expert like Donald Henderson believes, at least within the realm of biological weapons, that it is unlikely that more than a few terrorist groups would be able to succeed in procuring any of the agents of highest concern in a form that could be dispensed by aerosol in a manner that would result in mass casualties.⁹⁹

In sum, there is little consensus in the literature in general discussions about the probability that terrorists possess a WMD capability. The only discernible area of agreement between the various scholars and analysts seems to be that there exists at least a minimal possibility of a technologically and organizationally adept terrorist organization succeeding in acquiring a CBRN weapon capable of causing mass casualties, and that a nuclear weapons capability is the most difficult of the four types of WMD to achieve¹⁰⁰.

⁹⁵ *Ibid*; Charles Ferguson et al, “Commercial Radioactive Sources: Surveying the Security Risks,”); Peter D. Zimmerman and Cheryl Loeb, “Dirty Bombs: The Threat Revisited,” *Defense Horizons* 38. Center for Technology and National Security Policy, National Defense University (January 2004).

⁹⁶ As will be argued below, despite superficial similarities in certain aspects (such as both requiring aerosolization for optimal delivery) the capabilities required to deploy chemical and biological weapons differ markedly in other aspects and should be considered separately.

⁹⁷ Kamp, et. al., “WMD Terrorism,” p.170. Kamp’s endorsement of Falkenrath’s position on chemical and biological terrorism is noteworthy, particularly since Falkenrath et. al. have been accused of alarmism over their comments on the prospects for nuclear terrorism and opinions such as the following regarding bioterrorism: “a biological weapons project faces no fundamental barriers that would be insurmountable by a small team of individuals with good skills in experimental biology and engineering.” (Falkenrath, et. al., *America’s Achilles’ Heel*, p. 112).

⁹⁸ Jean Pascal Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” *Nonproliferation Review* 6:4. (Fall 1999), p. 18.

⁹⁹ Donald A. Henderson, “The Looming Threat of Bioterrorism,” *Science* 283:406 (February 26, 1999), p. 7.

¹⁰⁰ One exception to this is Schaper, (Alexander Kelle and Annette Schaper, “Terrorism using Nuclear and Biological Weapons: A Critical Analysis of Risks after 11 September 2001,” Peace Research Institute Frankfurt (PRIF), *PRIF Reports* 64), who avers that nuclear attacks are a “more suitable next step” for terrorists than are large scale biological attacks, “unless terrorists can manage to produce and effectively spread a pathogen that causes infectious disease and, therefore, an epidemic.” (p. 32) She sees the creation of a nuclear device by terrorists as requiring enormous effort, yet “revelations over the preparations undertaken for the attacks against the World Trade Center show that terrorists are prepared to go this far to achieve their aims.” (p. 19).

Is the capability of terrorists with regard to WMD increasing?

One remarkable feature within the broader discussion about terrorist capabilities for WMD terrorism is that hardly any of those who believe terrorists currently lack this capacity mention anything about future developments. If recent trends in terrorism have taught us anything, it is that terrorists are nimble, highly adaptive actors who can be innovative when necessary. At the same time, technological development is inherently dynamic, with one of the negative externalities of this dynamism being the opportunities it can provide for malefactors. Consequently, even if terrorist groups may lack the capability to engage in WMD attacks today, it is necessary to consider the prospects for them gaining this capability in the future, with special attention paid to both the direction and pace of change.

As early as 1997, Bruce Hoffman spoke of eroding technical constraints and increasing terrorist capabilities in this area.¹⁰¹ This concern was echoed by Falkenrath et. al., who listed five factors contributing to this increasing WMD capability¹⁰² and elsewhere asserted that “the likelihood of acts of NBC terrorism in the future is low, but it is not zero and it is rising”¹⁰³. On the other hand, Zanders seems to believe that, at least in the realm of chemical and biological weapons, terrorist capabilities are actually decreasing. He puts forward the argument that the increasing salience of international norms of nonproliferation (and consequent greater vigilance by suppliers) will make it more difficult for terrorists to legitimately acquire needed outside sources of equipment and raw materials.¹⁰⁴ We find this argument somewhat spurious in that it neglects a) the long list of unscrupulous suppliers, both state and non-state, that have consistently flouted international restrictions on “controlled” agents and equipment, and b) the fact that the amounts of certain dual-use materials and equipment (at least those of the chemical, biological, and radiological variety) required to construct a WMD are often far below the thresholds for surveillance by any national or international nonproliferation entity.

Besides Zanders’ curious assertion, the majority opinion is best summed up by Gurr and Cole: “Analysts are now almost unanimous in concluding that it is becoming increasingly easy for terrorist groups to develop NBC weapons, yet there is a dichotomy within the literature over

¹⁰¹ Bruce Hoffman, “Terrorism and WMD: Some Preliminary Hypotheses,” *Nonproliferation Review* 4:3, pp. 45; 51.

¹⁰² Falkenrath, et. al., *America’s Achilles’ Heel* discuss the following factors as the primary drivers behind “growing non-state capabilities and ... shrinking NBC acquisition hurdles” (p. 213):

- a) technical barriers to WMD are at most fixed and are probably declining.
- b) the latent ability of non-state actors to master NBC [Nuclear, Biological and Chemical] challenges is rising in all modern societies.
- c) the underlying scientific and technical competence of U.S. and other populations is rising with time, for example the rise of the biotechnology industry means that there are now more skilled workers, a greater number of labs, easier access to equipment etc.
- d) the Internet makes information acquisition and communication of breakthroughs easier.
- e) the general efficiency of non-state operations is outpacing the efficiency of state operations, at least in the U.S. and probably everywhere in the developed world.

¹⁰³ Falkenrath, “Confronting Nuclear, Chemical and Biological Terrorism”.

¹⁰⁴ Zanders, “Assessing the Risk,” p. 33.

exactly how easy it is."¹⁰⁵ Gurr and Cole simultaneously advise more careful scrutiny of the basic assumptions underlying this majority view.¹⁰⁶

If terrorists' WMD capabilities are increasing, what is the rate of this change?

Just as any student of elementary physics will testify, it is rarely sufficient to merely discern that a body is moving and whether it is speeding up or slowing down. What is often crucial for any type of analysis is some measure of the rate of change. We believe that this applies equally to terrorist acquisition of a WMD capability, and yet, with the exception of Foxell,¹⁰⁷ who seems to imply that terrorist capabilities in this regard are rising rapidly, this question is hardly addressed in the open source literature surveyed for this paper. We have thus highlighted an examination of the rate of change of terrorist capabilities for WMD (i.e., are terrorists likely to acquire these capabilities within five years? Or fifteen? Or fifty?) as an urgent research need.¹⁰⁸

Broad Trends

To gain further clarity on the above questions necessitates a more detailed examination of the various constituent elements of a WMD capability. It is important to note that there are also broad, sometimes exogenous, factors that may shape future terrorist capabilities, and these should be mentioned at the very outset.

a) Terrorist capabilities in general are increasing

The first broad factor to consider is that generally the past decade has witnessed an increasing sophistication among many terrorist groups, in terms of both logistics and tactics. The attacks of September 11, 2001 using hijacked aircraft, and the Madrid bombings of 2004, are merely two examples that overall terrorist capabilities for inflicting damage are increasing (or at least not decreasing). One must bear in mind that even though a terrorist group's ideology may seem in the eyes of their opponents to be archaic and obscurantist, this does not mean that the group lacks a solid grasp of the most modern technology. The most radical purveyors of all sorts of idiosyncratic beliefs are often quite comfortable navigating loopholes in the international financial system or using hard encryption to protect their communications. Meanwhile, the number of terrorists skilled in basic tradecraft and receiving military-type training is hardly waning – as is illustrated by the radical jihadist training camps in several countries and various right-wing paramilitary schools throughout the Western world. Several commentators continue

¹⁰⁵ Gurr and Cole, *New Face of Terrorism*, p. 41.

¹⁰⁶ We provide this in the detailed factor discussions below.

¹⁰⁷ Joseph W. Foxell, Jr., "The Debate on the Potential for Mass-Casualty Terrorism: The Challenge to US Security," *Terrorism and Political Violence* 11:1 (Spring 1999), p. 13.

¹⁰⁸ In this vein, the research staff of the Monterey WMD Terrorism Research Group have proposed a project to explore the purported rise in terrorist capabilities to engage in WMD attacks through the application of various models of technological change and innovation. Examples of such technologies include cheap, accessible sprayers for CW, nanotech, proteinacious microspheres, aerosol vaccine delivery, bioinformatics, SNP's (single nucleotide polymorphisms) and Bose-Einstein condensates. The proposed study will utilize a framework that examines the effects of technological change on patterns of behavior. It will focus upon various models of technological change, particularly the concept of disruptive versus sustaining technologies (developed by Christensen at Harvard Business School). The aim of the project is to indicate the behavioral and technological mechanisms behind changes in the instruments of terror.

to insist that terrorists operate in a less permissive environment than states.¹⁰⁹ While some progress has certainly been made in reducing the number of terrorist havens and operative cells in the West, “lawless” regions in which terrorism can fester still abound globally and the maintenance of complex transnational networks allows terrorist groups to operate from multiple locations. At the same time, the counterterrorist operations of most countries – often beset by bureaucratic inertia or an absence of imagination – seem to lack a concomitant level of dynamism or adaptability.

b) Societal changes can facilitate terrorist capabilities

Terrorist capabilities should always be evaluated in the context of both the technological level and the vulnerabilities of the societies in which or against which they operate; indeed, Zanders emphasizes that “the terrorist organization feeds from the society that spawns it.”¹¹⁰ General technological advances in several areas and the rapid commercialization and diffusion of technology mean that equipment and techniques that once resided within the sole purview of a state’s military apparatus (such as the ability to synthesize complex chemicals) can now be found in off-the-shelf commercial applications. This notion is supported by both Stern¹¹¹ and Marlo¹¹² who argue that advances in technology and its increasing availability facilitate the acquisition by terrorists of WMD.

At the same time, trends within modern society itself are arguably making us more vulnerable to WMD terrorism and hence providing an opportunity for terrorists to conduct attacks using unconventional weapons. Campbell mentions, amongst other factors, that, “...the increasing density of urban areas and the multiplicity of vulnerable targets therein facilitates mass casualties and infrastructure disruption; [and]... the freedoms provided by Western democracies allow terrorists to establish networks that allow them to develop financial resources, carry out paramilitary training, provide advanced educational opportunities, and permit the procurement of weapons, material, and WMD-related technology”.¹¹³ In terms of the actual attack planning process, Falkenrath, et. al. support the notion that the normal “background noise” of modern Western society, dominated as it is by a multiplicity of commercial, electronic and remote social interactions, makes it easier for terrorists to conceal their WMD activities.¹¹⁴

The specific factors relating to terrorists’ WMD capability detailed below should be viewed in the context of these general trends in order to place the WMD issue within more general trends in the phenomenon of terrorism.

Factors Related to WMD Capabilities

Examining individual factors related to a terrorist group’s capability to perpetrate WMD attacks presents two immediate difficulties. The first involves combinatorial complexity. The differing requirements in terms of expertise, materials, and equipment necessitate a separate examination

¹⁰⁹ Falkenrath, et. al, *America’s Achilles’ Heel*, p.30

¹¹⁰ Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation,” p. 26.

¹¹¹ Stern, *Ultimate Terrorists*, p.10.

¹¹² Marlo, “WMD Terrorism and US Intelligence Collection”.

¹¹³ Campbell in Brad Roberts, ed. *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses*. (Alexandria, VA.: Chemical and Biological Arms Control Institute, 1997), pp. 27-30.

¹¹⁴ Falkenrath, et. al., *America’s Achilles’ Heel*, p. 139; Stern, *Ultimate Terrorists*, p.4.

of each of the four main types of WMD under each capability-related category. When a further distinction is made between the attribute levels required to attain a WMD capability and the attribute levels that terrorist groups are already believed to have attained, the discussion runs the risk of becoming more convoluted still. We attempt to reduce this complexity by only noting those factors we believe to be most relevant to this discussion. The second difficulty relates to the interaction between various factors – which factors are most important and how should the various factors be weighted in reaching any conclusions? It appears that some factors are necessary for a WMD capability, others are sufficient, and some are merely facilitative, and, as such, designations along these lines will be made explicit wherever possible.

Although some analysts reportedly believe that the level of technological difficulty does not vary much between the different types of WMD,¹¹⁵ most of the literature surveyed makes a careful distinction between the capability of terrorists to engage in one form of WMD attack (say, large-scale chemical terrorism) and their capability to perpetrate a WMD terrorist incident using a different type of agent. Moreover, even within the same agent type, weapons based on certain agents are more difficult to develop than those based on others¹¹⁶.

Experts have divided the process of carrying out a terrorist attack using WMD into several separate stages. Marlo, for example, lists five separate phases, viz. “(1) the decision to obtain and use WMD; (2) acquisition of expertise, production equipment, and material; (3) production of weapon; (4) testing; and (5) planning and conducting an attack.”¹¹⁷ However parsimonious such schemas might seem, we feel that, by concentrating on only the weapon development process, they neglect several, often more intangible, forces that play a role during the entire process. Moreover, while serving as useful heuristic devices, the actual attack process is usually far less systematic than such lists would lead one to believe – decisions, influences and actions rarely operate sequentially but instead do so in parallel, encompassing nonlinear elements such as trial-and-error feedback loops and iterative improvement. We have therefore chosen to categorize the contributing elements of a WMD capability into the following broad typology, which in certain respects resembles the stages of weapon development, but differs markedly in others:¹¹⁸

- Organizational Capabilities
- Logistical Resources
- Financial Resources
- Knowledge/Skill Acquisition
- Materials and Technology Acquisition
- Initial Production of Agent
- Weaponization of Agent

¹¹⁵ Frank Barnaby interview on January 25, 1999, quoted in Gurr and Cole, *New Face of Terrorism*, p. 41.

¹¹⁶ See, for instance, Pilat in Roberts, *Terrorism with Chemical and Biological Weapons*, pp. 3-4: “The use of chemicals does not necessarily mean that other weapons of mass destruction are more likely to be used by terrorists; in fact, it is increasingly recognized that chemical weapons are very different from nuclear and biological weapons in terms of their capabilities.” Falkenrath, et. al., also maintain that the difficulty of obtaining and using NBC weapons varies widely both between and within weapons types. See *America’s Achilles’ Heel*, p. 97.

¹¹⁷ Marlo, “WMD Terrorism and US Intelligence Collection”.

¹¹⁸ This categorization is far from unique; however it is one that in our opinion captures the majority of significant influences on a WMD capability.

The above factors will be discussed in turn, with the understanding that they are to be construed neither as mutually independent nor strictly sequential. Note that the first four categories above – Organizational Capabilities, Logistical Resources, Financial Resources, and Knowledge/Skill Acquisition – are all related to the existing characteristics of particular terrorist groups or their members and hence do not require separate treatment in connection with every different type of CBRN weapon. However, the final three factors that are relevant to assessing WMD capability cannot be discussed in similarly general terms, and must therefore be dealt with separately for each of the four weapons types.

Organizational Capabilities

Requirements

In addition to the process of acquiring and producing a WMD, there are also more general capabilities and attributes of the group that can either facilitate or hamper the process described above. The first of these can be situated under the general rubric of group organization and includes such factors as group size, mechanisms of leadership, degree of centralization of authority, internal dynamics and the structural ability to innovate and absorb new technologies. Little is mentioned in the literature concerning these factors as they particularly relate to WMD, but it can be surmised that an undertaking requiring the technical and tactical sophistication and relatively long planning horizon associated with the use of a true WMD would most likely involve a group with more than a handful of members, one in which there is some form of central leadership which can coordinate weapons development and/or acquisition, as well as one that will exercise the requisite control for the maintenance of secrecy. Zanders proposes that only a disciplined, focused group which is “vertically organized, highly integrated and ideologically uniform” would appear to have the capacity to initiate and maintain in secrecy a large volume production line for CBW agents.¹¹⁹

Extent to which these Requirements are Likely to be Met

According to Zanders, the most likely candidates for his organizational criteria are religious sects, which reduces the number of potential groups who could develop WMD.¹²⁰ Some other groups, including certain nationalist terrorist groups, would also fit the bill. Jackson argues that action-oriented groups that depend on constant operations to maintain their structural integrity are unlikely to be capable of maintaining a WMD program that may take months or years to bear fruit.¹²¹

Logistical Resources

Requirements

Merely having technical expertise, good management and copious funding is probably insufficient to succeed in a WMD attack. The group’s WMD activities need to be supported by an efficient logistical backbone including adequate transportation and communications. A particular need in this regard is a relatively safe haven where development efforts can take place

¹¹⁹ Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” p. 30.

¹²⁰ *Ibid.*

¹²¹ Jackson, “Technology Acquisition by Terrorist Groups,” p. 205.

unhindered, or at least a location where these efforts can proceed with little chance of detection. Unfortunately, it is possible to maintain a small-scale production of chemical or biological agents in an area as small as a sizeable basement. If production continued long enough, sufficiently large quantities of agent could be produced. An important, if somewhat less tangible, asset in any terrorist WMD endeavor would be a robust and preferably transnational network for acquiring raw materials and equipment, as well as transporting the completed weapon to its destination.

Extent to which these Requirements are Likely to be Met

Several modern terrorist groupings, including the al-Qa`ida network, would be able to fulfill the above logistical criteria. In fact, al-Qa`ida reportedly maintained several biological and chemical weapons-related facilities in Afghanistan prior to the U.S. invasion in 2001, and Aum managed to operate a state-of-the-art, secret laboratory at the base of Mount Fuji.¹²² In terms of supplier and other networks, the A. Q. Kahn network based in Pakistan, Russian illicit trafficking networks and smugglers who are adept at moving both people and materiel into the United States do not bode well for either keeping WMD materials out of the hands of terrorists or keeping the completed WMD from entering our borders. On a positive note, while indicators for a small-scale, basic chemical, biological, or radiological program are minimal, as the scale and sophistication of the production increases so do the number of observable indicators.¹²³ In fact many groups within the U.S. who tried to develop CBRN agents or weapons have been infiltrated by the FBI and other law enforcement agencies.¹²⁴

Financial Resources

Requirements

One of the most often cited requirements for a terrorist WMD capability is a large source of funding to procure materials and equipment and provide training, facilities, and/or payment for personnel involved in the project. Some refer to these needs as “cost-prohibitive,”¹²⁵ but this is not necessarily the case. The following estimated costs for the various weapons types are derived from the findings of, amongst others, Falkenrath et. al.¹²⁶ and Ron Purver.¹²⁷ Not all of these costs will necessarily be incurred in every case (for instance, material and equipment could be stolen or received from supporters rather than purchased):

<u>Weapon Type</u>	<u>Estimated Financial Cost to Terrorist</u>
Nuclear	Fissile material – likely to be extremely expensive (as high as a million dollars per kilogram or more) Other costs for a crude weapon – a few hundred thousand dollars.
Radiological	Radiological material – unknown cost on the black market.
Biological	Less than a few hundred thousand dollars (e.g. production of botulinum toxin for \$400 per kilogram)

¹²² Marlo, “WMD Terrorism and US Intelligence Collection”.

¹²³ Gurr and Cole, *New Face of Terrorism*, p. 71.

¹²⁴ See Jonathan B. Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons* (Cambridge, MA: MIT, 2000) for examples.

¹²⁵ Cameron, “WMD Terrorism in the United States.”

¹²⁶ Falkenrath, et. al., *America’s Achilles’ Heel*, pp. 112; 126.

¹²⁷ Ron Purver: “Chemical and Biological Terrorism: New Threat to Public Safety” *Conflict Studies* 295 (December 1996 – January 1997), p. 6.

Chemical	Cheapest option – less than ten thousand dollars for basic start-up (more expensive agents like sarin could be produced for approx. \$200 per kilogram).
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There may even be more low-cost options such as hiring facilities and equipment instead of purchasing them, although this would undoubtedly increase the risk of discovery.

Extent to which these Requirements are Likely to be Met

It appears that a certain level of finances is a necessary but not sufficient condition for developing a WMD. Aum Shinrikyo possessed assets valued somewhere between \$300 million to \$1 billion¹²⁸ and still failed to develop a viable biological weapon. However, Gavin Cameron points to substantial financial resources as key factors in enabling both Aum and al-Qa`ida to pursue multiple weapon types, set up front companies and “buy their way out of technical difficulties”.¹²⁹ In addition to the al-Qa`ida network, there are today several terrorist groups with sufficiently deep pockets to facilitate the initiation and maintenance of a WMD program, should they so desire. These include the LTTE, Hizb`allah and the FARC in Colombia.

Knowledge/Skill Acquisition

Requirements

A necessary element of a WMD capability is the technical knowledge and skills required to produce and deploy a large-scale chemical, biological, radiological or nuclear weapon. This can arise from two types of sources: a) the indigenous development of knowledge and skills within the group; and b) obtaining the necessary skills by utilizing personnel from outside the group.

Whichever route a group takes to acquire the relevant knowledge/skill set, it must be borne in mind that technological learning consists of the transfer of both *explicit knowledge* (that which can be written down in textbooks, manuals, and so forth) as well as the equally important transfer of *tacit knowledge* (which comes from experience, or face-to-face practical instruction).¹³⁰ Terrorists need to acquire both types of knowledge if they hope to successfully develop a WMD capability. This is related, but not quite identical, to acknowledging the major difference between theoretical weapons knowledge and practical engineering skill, for without the latter the former are all but useless to a terrorist group. Developing a WMD does not require skill in only the primary discipline under consideration, since in most cases a wider range of scientific and technical skills is necessary. Although Aum Shinrikyo had several microbiologists working on developing biological weapons, one of the reasons for their failure was that these scientists were forced to take on tasks outside their area of specialization. For this very reason, Marlo points out that if Aum were to have utilized the skills of a pathologist, an engineer, a meteorologist and an aerosol physicist, they would have had greater success at weaponizing biological agents.¹³¹ Moreover, Gurr and Cole note that in certain cases there are “tricks of the trade” in WMD development that

¹²⁸ Marlo, “WMD Terrorism and US Intelligence Collection.”

¹²⁹ Gavin Cameron, “Multi-track Microproliferation: Lessons from Aum Shinrikyo and Al Qaida,” *Studies in Conflict and Terrorism* 22:4 (November 1999).

¹³⁰ Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption,” *Studies in Conflict and Terrorism*, 24:3 (2001), p. 198.

¹³¹ Marlo, “WMD Terrorism and US Intelligence Collection”.

are not widely known, and that even a skilled person who has not had experience in weapons development will face a learning curve in transcending such barriers.

The other option of course, is to acquire the services of scientists and technicians who have worked on CBRN weapons programs in the past. Zanders argues that a terrorist group is unlikely to be able to hire such personnel, as it must go to the trouble of recruiting those who share similar ideological beliefs.¹³² We do not feel that this additional constraint is necessarily warranted, since history is replete with examples of persons who have undertaken the most nefarious operations for simple material gain.

An additional requirement, rarely addressed in the literature, is that in order to launch effective WMD attacks on their enemies, as is the case with any attack, terrorists also require an in-depth knowledge of the target area and society.

Extent to which these Requirements are Likely to be Met

Several authors contend that there are now a multiplicity of educational resources by which terrorists can educate themselves on aspects of CBRN weapons, including college textbooks, academic journals, industry publications, and the Internet, and that they can thereby place themselves higher along the learning curve than terrorists from previous decades.¹³³ Various publicly available poison manuals, for instance, describe how to order and prepare chemical and biological agents,¹³⁴ and technical information on growing pathogens is widely available in the scientific literature. The Internet is often cited as an important resource for terrorists; for example, the patent for VX was apparently posted on the Internet after it was declassified.¹³⁵ The Internet can, however, prove to be a double-edged sword in that a) it does not usually facilitate the transfer of tacit knowledge, and b) it is far from being completely reliable.¹³⁶ In the context of conventional weapons, Brian Jackson asserts that “approximately thirty percent of the deaths caused by homemade explosives are the bomb-makers themselves.”¹³⁷

Besides this plethora of open-source materials, many potential terrorists could acquire knowledge and skills through legitimate educational programs. U.S. universities alone graduate thousands of Ph.D.s in the physical and life sciences every year, many of them foreign students. Ramzi Yusuf, one of the most notorious of modern terrorists used his education at the University of Swansea in Wales to equip him with skills he later applied to create extremely sophisticated bombs. It is also well-known that Aum Shinrikyo specifically recruited members with a scientific and technical background.

¹³² Zanders, “Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists,” p. 29.

¹³³ Cameron, “WMD Terrorism in the United States,” and Falkenrath, “Confronting Nuclear, Chemical and Biological Terrorism,” p. 55; Gurr and Cole, *New Face of Terrorism*, p. 42, note that Aum Shinrikyo began their CBW programs with an extensive literature search, including downloading the entire protein data bank from Brookhaven National Laboratory (with details on the chemical breakdowns of various toxins).

¹³⁴ Stern, *Ultimate Terrorists*, pp. 50-51.

¹³⁵ Gurr and Cole, *New Face of Terrorism*, p. 42.

¹³⁶ Garrett (in Laurie Garrett, “The Nightmare of Bioterrorism,” *Foreign Affairs* 80:1 (January/February 2001) p. 82) describes the example of the *Poisoner’s Handbook*, written by Maxwell Hutchkinson, which erroneously states that the toxin ricin mixed with dimethylsulfoxide can be absorbed through the skin of the victim.

¹³⁷ Jackson, “Technology Acquisition by Terrorist Groups,” p. 198.

Terrorist groups with dogmatic, charismatic leaders who exercise methods of social conditioning (such as religious cults) are among the groups most often characterized as most likely to engage in WMD terrorism. Yet it is these very groups that may inherently be poorly equipped to obtain the scientific expertise they desire. First of all, most of those who join such groups are alienated individuals to begin with, and despite having scientific backgrounds these individuals are unlikely to be among the more successful in their respective fields. Such groups may therefore self-select sub-standard technical personnel.¹³⁸ Even if initial recruitment efforts elicit a talented crop of new members, the conditioning and indoctrination methods these groups often employ are far from conducive to successful scientific work. In the case of Aum Shinrikyo, a paranoid atmosphere that included such practices as sleep deprivation and the use of narcotics may well have inhibited their capability to develop a successful biological weapons capability¹³⁹ (although they did succeed in producing sarin and other chemical agents).

These arguments reflect the general hypothesis, widely accepted in the area of individual threat assessment, that while the psychologically ill are among the most likely to possess the motivation to engage in mass-casualty attacks, their psychopathologies usually prevent them from developing the skills and fulfilling the necessary tasks to reach their goals, e.g., functioning as part of a team.

In terms of recruiting or hiring the services of personnel formerly employed by state-level weapons programs, there has been much talk about the desperate need or mercenary bent of scientists in the weapons programs of the Former Soviet Union, South Africa and Iraq.¹⁴⁰ Gurr and Cole question the prospects of a terrorist group employing weapons scientists by pointing out several reasons why they would prefer to work for states.¹⁴¹ However, the current global climate does not present many state-level employment opportunities for former weapons scientists, and, as a result, they may be forced to look to non-state employers instead.

Knowledge/Skill Levels Needed for Different Agent Types

The literature makes some mention of the issue of expertise in the context of the different agent types. In terms of nuclear agents, the basic information on how to construct a nuclear bomb is well-known, even though the specifics are still classified. Certain criticality calculations do need to be performed by someone with advanced scientific training, but a good undergraduate education in physics or nuclear engineering is believed to suffice.¹⁴² Although nuclear weapons have proven difficult to manufacture even by states, it has been observed that crude devices can be built by people with a technical, but not necessarily weapons-specific, background.¹⁴³

¹³⁸ Falkenrath, et. al., *America's Achilles' Heel*, p. 23.

¹³⁹ William Rosenau, "Aum Shinrikyo's Biological Weapons Program: Why Did it Fail?" *Studies in Conflict and Terrorism* 24:4 (July 2001); Marlo, "WMD Terrorism and US Intelligence Collection".

¹⁴⁰ For example, see Tucker and Sands, "An Unlikely Threat".

¹⁴¹ Gurr and Cole, *New Face of Terrorism*, p. 69.

¹⁴² Falkenrath et. al., *America's Achilles' Heel*, p. 127.

¹⁴³ Cf. Lawrence Radiation Laboratory, "Summary Report of the Nth Country Experiment," March 1967. <http://www.thebulletin.org/issues/2003/ma03/ma03stober_doc.html>; Also, in 1987, a team of nuclear weapons designers concluded that a terrorist group, after acquiring the necessary fissile material, could assemble a nuclear weapon if it had a team of 3 or 4 specialists in the metallurgical, physical, and chemical properties of the materials. See Paul Leventhal and Yonah Alexander, *Preventing Nuclear Terrorism* (Lexington, MA: Lexington Books, 1987), pp. 58-59.

When discussing the production of chemical weapons, the level of expertise needed is far lower;¹⁴⁴ Falkenrath et. al. assert that a smart, technically educated person with a knowledge of chemistry “at the college level or less” should be able to handle at least small production runs from direct precursors within a short space of time.¹⁴⁵ These authors further argue that one competent microbiologist (to produce the deadly pathogen) and an experimental physicist or mechanical engineer (to work on aerosol delivery) could be sufficient to create a working biological weapon.¹⁴⁶ In contrast, Schaper highlights the case of Aum to argue that a degree in biology and unlimited finances are not sufficient for the production and use of biological weapons.¹⁴⁷

Remaining WMD Capability Factors

As noted above, the other three factors related to WMD capability – Materials and Technology Acquisition, Production, and Weaponization and Delivery – need to be discussed in connection with specific types of CBRN weapon.

A) Chemical Weapons

Materials and Technology Acquisition

Requirements

The requirements for chemical weapons include precursor chemicals and standard dual-use equipment for most agents. All else being equal, the more basic the initial precursor chemicals the terrorists obtain, the more reaction steps will be required to produce the desired chemical agent and the longer and more complex the production process. Certain processes for more complex chemical agents (such as certain of the G-series nerve agents) require specialized equipment that can withstand corrosion, high temperatures and high pressures.

Extent to Which These Requirements are Likely to be Met

The dual-use nature of many precursor chemicals and equipment puts at least simple toxic chemical agents within the reach of almost all terrorist organizations with the requisite expertise. Even recognized precursor chemicals controlled by international conventions such as the Chemical Weapons Convention (CWC) may be available to terrorists, since most international nonproliferation instruments were designed to prevent state-level programs, and hence do not operate on the small quantities likely to be sought by terrorists. For example, the CWC does not govern precursor chemicals weighing less than one metric ton.¹⁴⁸ Terrorists could also steal chemical weapons agents from existing national stockpiles, such as from the thousands of tons of old chemical weapons stored in Russia (which is far behind in its destruction schedule). There

¹⁴⁴ Falkenrath, “Confronting Nuclear, Chemical and Biological Terrorism,” contends that the “use of a highly toxic chemical agent as a WMD is not especially difficult in principle.” p. 48.

¹⁴⁵ Falkenrath, et. al., *America’s Achilles Heel*, p. 102; 106.

¹⁴⁶ *Ibid*, p.112. The authors admit (p.98) that the aerosols thus produced might be less than optimally efficient, but would be nonetheless deadly.

¹⁴⁷ Kelle and Schaper, “Terrorism Using Nuclear and Biological Weapons,” p. 5.

¹⁴⁸ Falkenrath, et. al., *America’s Achilles’ Heel*, p. 104.

have even been reports of the existence of an international body, referred to as the “CBW Mafia,” which traffics in chemical and biological agents and equipment. Aum Shinrikyo demonstrated that even without state support it is possible for a group to acquire large amounts of precursors; Aum acquired 50 tons of phosphorus trichloride and 10 tons of sodium fluoride, both nerve agent ingredients.¹⁴⁹

Production

Requirements

The requirements for chemical weapons production are dependent on the specific agent employed and the amount of agent desired by the group (for a mass casualty incident, this is likely to be a fairly substantial amount). Certain agents are simple to produce, such as hydrogen cyanide, while others, including the vesicants, such as mustard and lewisite, are more difficult. Most of the nerve agents require an even more involved process. However, as long as a group has sufficient time, a large facility is generally not essential.¹⁵⁰ Certain production methods and high-purity products require specialized equipment, such as non-corrosive materials that could draw attention to the group. Even more so than biological weapons, the volatility of most chemical agents means that they must be handled carefully and that safety precautions must be in place to avoid the premature release of precursors or the completed agent.

Extent to Which These Requirements are Likely to be Met

Most authors use the case of Aum Shinrikyo to argue that the production of chemical weapons agents can be achieved, yet add cautionary notes about the poor quality of the sarin used in the Tokyo subway attack of 1995. It should be taken into account, however, that the Tokyo attack was planned and conducted in a hurry and that, on other occasions, the group had managed to synthesize extremely pure forms of sarin (in addition to VX and other agents). Many alternative synthesis methods exist for producing most chemical weapons agents,¹⁵¹ and it is likely that terrorists would avoid those that use high-temperature and high-pressure reactions¹⁵² in order to obviate the need for special equipment and reduce the possibility of injury or discovery resulting from an accidental release.

Weaponization and Delivery

Requirements

Chemical agents are also most effectively distributed by aerosol, although in this case environmental factors play less of a role¹⁵³ and toxic chemical agents do not require any drying or milling. This makes dissemination easier, allowing for the use of improvised spray equipment and dispersion via explosive charge¹⁵⁴. Many chemical weapons agents are also volatile and so will spontaneously vaporize at STP (standard temperature and pressure). Storage and safety

¹⁴⁹ Stern, *Ultimate Terrorists*, p. 65.

¹⁵⁰ Gurr and Cole, *New Face of Terrorism*, p. 50.

¹⁵¹ Falkenrath, et. al., *America's Achilles' Heel*, p. 107.

¹⁵² Gurr and Cole, *New Face of Terrorism*, p. 51.

¹⁵³ Wind and precipitation still affect the path of a chemical cloud.

¹⁵⁴ Falkenrath, et. al., *America's Achilles' Heel*, p. 107.

concerns can in some cases be ameliorated by the use of binary weapons, in which two or more relatively innocuous compounds are mixed only at the time of the attack to form a lethal chemical.

Extent to Which These Requirements are Likely to be Met

Chemical agents are broadly considered to be the easiest agent types to weaponize and deliver, and thus within the technical capabilities of many terrorist groups. This does not mean, however, that there are no further technical hurdles to their use. The purity of the agent and efficiency of the delivery can have a large impact on the ultimate effects of an attack.¹⁵⁵ Similar considerations apply to the use of chemical agents to contaminate food or water systems.

B) Biological Weapons

Materials and Technology Acquisition

Requirements

The material requirements for a biological weapon include a seed stock of the desired pathogen, easily-available growth media, and equipment such as a fermenter or lyophilizer. While some authors portray the needed equipment as being of a specialized nature,¹⁵⁶ others describe the equipment as dual-use and easy to obtain.¹⁵⁷ This apparent discrepancy can be explained by realizing that much depends on the scale of production and the organism being produced. Standard commercial or laboratory equipment can be sufficient for some agents and small-scale production, whereas to quickly create large amounts of agent or apply special processes such as micro-encapsulation, more specialized equipment is required.

Extent to Which These Requirements are Likely to be Met

The following are the possible sources of seed stocks:

- a) **The natural environment:** many harmful microorganisms are endemic across wide areas and can be collected directly from the soil or from infected animals. The drawbacks of this method include the difficulty of isolating the organism from the sample and ensuring a sufficiently virulent strain for the purposes of a biological weapon. Aum Shinrikyo sent a mission to Zaire during the Ebola outbreak of 1992, ostensibly to provide medical assistance. It is believed that Aum's true purpose was to collect samples of the Ebola virus.¹⁵⁸
- b) **Purchasing seed stocks from a culture collection:** while culture collections in the United States now have stricter controls (after Larry Wayne Harris, an individual with dubious

¹⁵⁵ Aum Shinrikyo only used a solution of 20% pure sarin in the Tokyo subway attack, as well as the decidedly inefficient dispersal mechanism of puncturing plastic bags filled with the sarin solution. Consequently, their attack, using one of the most toxic substances known, resulted in only twelve fatalities.

¹⁵⁶ Tucker and Sands, "An Unlikely Threat."

¹⁵⁷ Falkenrath, et. al., *America's Achilles' Heel*, p. 113.

¹⁵⁸ Kyle Olson, testimony "Global Proliferation of Weapons of Mass Destruction: Case Study on Aum Shinrikyo" Permanent Subcommittee on Investigations, Committee on Government Affairs, US Senate Hearing, Global Proliferation of Weapons of Mass Destruction, Part I (Washington D.C.: Government Printing Office, 1996).

motives, purchased *yersinia pestis* (plague-causing organisms) in 1995), many collections in other countries lack even basic controls. Moreover, by setting up front companies,¹⁵⁹ terrorist groups such as Aum Shinrikyo have succeeded in “legitimately” purchasing dangerous pathogens.

- c) **Theft of seed stocks** from hospital, university, or commercial laboratories.
- d) **Transfer of seed stocks from a state-level biological weapons program:** while this avenue implies greater risks for all parties, it could enable terrorists to obtain more advanced biological weapons agents, such as organisms cultured for antibiotic resistance.
- e) **Creation of pathogen from genetic building blocks:** although this has recently become at least a theoretical possibility, it is extremely doubtful that any terrorist group currently possesses the requisite technology or expertise. However, with so many Soviet-era bioweaponeers apparently looking for work and the inevitable diffusion of technology, this possibility may not remain quite so remote in the future.

Production

Requirements

Once the biological seed stock has been acquired, the next steps are to grow the organisms in bulk. While simply culturing microorganisms is a fairly straightforward process, there are a number of additional requirements that make producing pathogens for weapons purposes somewhat trickier. These include culturing the organism without losing any of its virulence or infectivity factors, and storing it safely and reliably until the following stage of weapon development. Since terrorists will be dealing with highly pathogenic organisms, there is obviously the matter of personnel safety. It is also at this stage that any alterations to the organism (for example genetic manipulation to increase infectivity) would need to take place.

Extent to Which These Requirements are Likely to be Met

Well-understood, relatively hardy organisms should present little trouble for a skilled microbiologist to produce in bulk (especially if agent purity is not too much of a concern, as would likely be the case in the context of terrorism). However, the expertise and equipment needed vary according to the type of agent produced. For example, it is generally the case that viral agents are more difficult to produce than bacteria or toxins. Advanced techniques such as genetic manipulation are felt to be beyond the capabilities - or even the desire, since natural pathogens are mostly sufficiently harmful for terrorist purposes - of most groups. Gurr and Cole, however, contend that as biotechnology improves and existing techniques become more widely known, terrorists may be able to produce more advanced weapons agents, especially if they have access to the expertise of former Soviet bioweaponeers who successfully developed many of these techniques. In terms of worker safety, practice in this regard depends very much on the nature of the terrorist group - some organizations (even those who use suicide terrorism like jihadist groups) are extremely cognizant about their members' well-being, whereas others may show little or no concern.¹⁶⁰ Furthermore, with modern equipment, there are likely to be almost no external indicators of a terrorist group's activities at this stage.

¹⁵⁹ David Claridge, “Exploding the Myths of Superterrorism,” *Terrorism and Political Violence* 11:4 (Winter 1999), p. 139.

¹⁶⁰ Iraqi technicians working on chemical and biological weapons were apparently afforded little or no protection.

Weaponization and Delivery

Requirements

While it may be accurate to state that “a few hundred kilograms of a properly weaponized bacterial agent, when dried and milled to a precise particle size, has the potential to wipe out the inhabitants of an entire city,”¹⁶¹ the devil, as they say, is in the details. In other words, the effect of a biological attack is determined to a large extent by how well the agent has been weaponized. The most effective way to deliver biological agents is in the form of an aerosol, which is a suspension of microscopic particles or droplets in the air. Biological agents can be dispersed in aerosol form, usually by means of some type of spray device, either as a fine powder (solid particles) or as a liquid slurry, although the powder form is considered to constitute a more effective weapon.¹⁶² In the powder form, particles must be between 1 and 5 microns in diameter in order to be absorbed into the lungs of victims. Dispersal also presents a number of difficulties, since sunlight, oxidation, air pollution, humidity¹⁶³ and other environmental and meteorological phenomena can deactivate many biological agents before they reach their targets.¹⁶⁴ Alternative modes of delivery include contaminating food or water supplies and even spreading a contagious agent through physical contact by inoculating a terrorist and then having him infect others. Testing of agents can be risky in terms of exposure of the group’s endeavor, but this is not absolutely necessary if a group is willing to accept some degree of uncertainty.

Extent to Which These Requirements are Likely to be Met

The conversion of bulk biological agent into an aerosolizable solid is believed by most observers to be a technically demanding task,¹⁶⁵ although the envelopes laced with *Bacillus anthracis* sent through the mail in 2001 confirmed that the production of aerosolizable spores is at least feasible by a technically proficient terrorist or terrorists,¹⁶⁶ despite the fact that this was not technically a WMD incident. If a dry aerosol is not attainable, Falkenrath et. al. believe that terrorists could substitute the less efficient liquid slurry.¹⁶⁷ While neither Iraqi BW scientists nor Aum Shinrikyo succeeded in weaponizing biological agents successfully, aerosol technology is constantly improving and becoming commercialized, which could enable future exploitation of this delivery method. If a group decides that aerosol delivery is beyond its grasp and settles on using a biological agent as a contaminant, there are still significant obstacles. Many researchers have found that large-scale contamination of water or food supplies would be more difficult or less effective than most people realize.¹⁶⁸ More modest contamination (e.g., of a single water reservoir or facility) by terrorists is certainly possible, but it would be unlikely to result in sufficiently large

¹⁶¹ Gurr and Cole, *New Face of Terrorism*, p. 53.

¹⁶² It is more difficult to process bulk agent into a stable, aerosolizable and viable powder, than to form a liquid slurry. However, it is easier to disperse the dry powder than the liquid, since liquid dissemination introduces further complications, including nozzle clogging and damage to the agent through sheer forces.

¹⁶³ Stern, *Ultimate Terrorists*, p.51; Tucker and Sands, “An Unlikely Threat.”

¹⁶⁴ Some sporulating organisms such as the bacterium that causes anthrax are, however, exceptionally robust and can survive in spore form for decades.

¹⁶⁵ Falkenrath, et. al., *America’s Achilles’ Heel*, p. 113.

¹⁶⁶ Presuming of course that the so-called “anthrax letters” were sent by a non-state actor(s), as most reports indicate.

¹⁶⁷ Falkenrath, et. al., *America’s Achilles’ Heel*, p. 113.

¹⁶⁸ Tucker and Sands, “An Unlikely Threat,”; factors operating against a mass-casualty result are, *inter alia*, dilution, water treatment, quality control and recalls/alerts.

numbers of casualties to constitute a WMD.¹⁶⁹ Foxell believes that terrorists could adapt shoulder-fired anti-aircraft missiles to deliver weaponized chemical or biological agents, to “kill thousands,”¹⁷⁰ although he does not provide details to support his conclusions and his is the only mention in the survey literature of such a possibility.

C) Radiological Weapons

Materials and Technology Acquisition

Requirements

Various radioactive isotopes can be used to make contaminating radiological weapons such as RDDs. These include Strontium-90, Cobalt-60, and Cesium-137.

Extent to Which These Requirements are Likely to be Met

There are many civilian sources of radioactive materials, including hospital equipment, industrial plants, nuclear facilities, and geological survey equipment. Foxell believes that radiological materials could even be extracted from contaminated nuclear waste sites and weaponized for use in RDDs.¹⁷¹ It is also far more likely that illicit trafficking in nuclear materials could enable terrorists to gain access to radioactive isotopes than to fissile materials. Examples of recent thefts of radioactive materials include the theft of a radioactive source in Nigeria which turned up in Western Europe, and the theft of Russian nuclear batteries.¹⁷²

Production

Requirements

This stage of weapon development involves working with highly radioactive isotopes (often including gamma emitters) to get them in a form that can be effective for delivery. The high levels of radiation mean that shielding and containment will be needed, which greatly complicates working with these substances. This may entail processing metal or oxide substances into particles small enough to be delivered.¹⁷³

Extent to which these requirements are likely to be met

Here too, the literature is divided, with certain authors arguing for the relative ease with which this could be achieved and others being more skeptical of terrorist capabilities in this regard.¹⁷⁴ The only point on which they all agree is that it is far easier to produce a radiological weapon than the nuclear variety.

¹⁶⁹ This is not to minimize the impact or import of such an attack, merely to distinguish it from attacks involving thousands of fatalities. Only aerosol dispersal or perhaps person-person infection is likely to result in major casualties.

¹⁷⁰ Foxell, “Debate on the Potential for Mass-Casualty Terrorism,” pp. 101-102.

¹⁷¹ *Ibid*, p. 106.

¹⁷² Ferguson, et. al., *Four Faces of Nuclear Terrorism*, p. 2.

¹⁷³ Note, however, that in the case of chemical and biological weapons, the formation of aerosolizable particles is most commonly viewed as part of the weaponization process.

¹⁷⁴ Ford, “Radiological Dispersal Device,” p. 4.

Weaponization and Delivery

Requirements

Once the radioactive material is in a form suitable for dispersion over a large area, the challenge becomes to achieve efficient delivery. In addition to dispersing the radioactive material through the kinetic forces generated by explosives, other options include aerosolizing small particles (perhaps even sprinkling them from the roof of a tall building) or contaminating food and water supplies (which contains its own set of technical hurdles). However, it must be remembered that none of these methods is likely to result in mass-casualties – the nature of radiological weapons make mass panic and mass disruption far more likely effects.

Extent to Which These Requirements are Likely to be Met

Cordesman acknowledges that there are “significant” disputes over the ease with which terrorist can “convert radioactive materials into a form that could be broadly disseminated over a wide area.” Specifically, he identifies the challenges of “grinding up” radioactive materials and somehow spreading them “over an area larger than a single facility.”¹⁷⁵ Jessica Stern cites the United States Army’s evaluation that RDDs are not militarily useful as evidence of the difficulty of achieving this capability,¹⁷⁶ although determination of military utility is quite different from the potential utility of such weapons to terrorists. Jacobs, on the other hand, seems to believe that effective radiological weapons fall well within the proficiencies of today’s terrorist groups.¹⁷⁷

D) Nuclear Weapons

Materials and Technology Acquisition

Requirements

To obtain a nuclear weapons capability, a terrorist group would either have to acquire a working nuclear weapon or else obtain fissile material and produce its own nuclear weapon. The most common fissile materials used in nuclear weapons are HEU (Uranium-235 enriched to more than 90%) or Plutonium-239. It is possible to use uranium enriched to a lower degree or Plutonium-240, but this requires greater amounts of material.¹⁷⁸ Estimates vary, but most authors argue that any terrorist-produced nuclear weapon would be a crude design, requiring an amount of HEU on the order of 16 kg or roughly 6kg of plutonium.¹⁷⁹ A crude weapon of this type is likely to be heavy (weighing more than a ton) and result in an explosive yield equivalent to less than 20 kilotons of TNT (Kt), and possibly even less than 1Kt.¹⁸⁰

¹⁷⁵ Cordesman, “Defending America,” p. 20.

¹⁷⁶ Stern, *Ultimate Terrorists*, p. 55.

¹⁷⁷ Jacobs, “Nuclear Threat as a Terrorist Option,” p. 153.

¹⁷⁸ It is believed to be virtually impossible for any terrorist group to be able to construct a weapon using more exotic fissile materials.

¹⁷⁹ Gurr & Cole, *New Face of Terrorism*, p. 46; A fission reaction could also be achieved by using plutonium oxide, although the amounts needed in this case are reportedly far greater (around 35kg) – Ibid.

¹⁸⁰ See the discussion of Carson Mark, Theodore Taylor, Eugene Eyster, William Marman and Jacob Wechsler for the 1985 *International Task Force on Prevention of Nuclear Terrorism* for detailed information on

Extent to Which These Requirements are Likely to be Met

A prominent fear in the past decade has been that non-state actors would succeed in stealing (or purchasing on the black market) an intact nuclear weapon, presumably from poorly guarded Soviet-era stockpiles. Stanley Jacobs asserts that this is a remote possibility, since these weapons contain PALS (Permissive Action Links) and other features to prevent detonation by unauthorized personnel. While this contention is itself contested,¹⁸¹ Jacobs ignores the fact that Pakistani nuclear weapons lack PALS and, consequently, that if these devices were to fall into the hands of terrorists they would most likely be able to detonate them.¹⁸² This is even more alarming in light of recent revelations of links between Pakistani nuclear scientists and the al-Qa`ida network, as well as a covert nuclear suppliers network operated by A. Q. Khan, Pakistan's most famous nuclear scientist.¹⁸³ There have also been several reports of missing Russian nuclear weapons, though analysts have debunked most of these.¹⁸⁴

Most of the literature surveyed concurs that it is highly unlikely that any terrorist group would be capable of producing its own fissile material.¹⁸⁵ If this is the case, the only option then left to terrorists would be to steal fissile materials or purchase them on illicit markets.¹⁸⁶ Some commentators highlight the reported cases of illicit trafficking in fissile materials and argue that this is just the tip of the iceberg.¹⁸⁷ There have, however, been no confirmed transfers of significant amounts of fissile material from smugglers to terrorists - many of the reported sales are either law enforcement "stings" or frauds - and the situation in Russia is ostensibly

these requirements; On a cautionary note, Cordesman warns that (unclassified) weapons design literature often "grossly exaggerates" the amount of fissile materials needed in the construction of a nuclear device. The exaggerations "can sometimes indicate that 50% to 200% more fissile material is required than is needed in a modern weapon of advanced design." See Cordesman, "Defending America: Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons," p. 33.

¹⁸¹ For excellent arguments that PALS can easily be over-ridden see Graham Allison, *Nuclear Terrorism* (New York: Times Books, 2004), pp. 89-92. As he puts it (*ibid*, p. 91), "[t]he bottom line is that PALS and ESDs [Environmental Sensing Devices] can temporarily delay, but cannot prevent, terrorists from using a stolen nuclear weapon."

¹⁸² See Kelle and Schaper, "Terrorism Using Nuclear and Biological Weapons," p. 24.

¹⁸³ Ferguson, et. al., *Four Faces of Nuclear Terrorism*, chapter 1.

¹⁸⁴ For a discussion of the debate over the so-called missing "suitcase nukes" stemming from Alexandr Lebed's 1997 allegations, see: Scott Parrish, "Are Suitcase Nukes on the Loose? The Story Behind the Controversy," *CNS Reports*, Center for Nonproliferation Studies (November 1997), Nikolai Sokov, "Suitcase Nukes: Permanently Lost Luggage," *CNS Research Story*, Center for Nonproliferation Studies (February 13, 2004), "Suitcase Nukes: A Reassessment," *Research Story of the Week*, Center for Nonproliferation Studies (September 23, 2002), Kelle and Schaper, "Terrorism Using Nuclear and Biological Weapons," pp. 26-27.

¹⁸⁵ Cordesman, "Defending America: Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons," p. 29; Falkenrath, et. al., *America's Achilles' Heel*, p. 127; Kelle and Schaper, "Terrorism Using Nuclear and Biological Weapons," p. 21.

¹⁸⁶ Gurr & Cole (*New Face of Terrorism*, pp. 57-58) describe Russia as having stockpiles of 125+ tons of plutonium and 1,200 tons of HEU. Moreover, the accounting of these materials is believed to be lacking in accuracy. The US-Russia Cooperative Threat Reduction (CTR) program is intended to address the security, or lack thereof, of these materials, but it is an imperfect regime; Graham Allison cites numerous attempts by terrorists to break into nuclear storage sites in Russia and the poor state of nuclear material accounting within the country. He also mentions the ease with which a terrorist could smuggle a sufficient amount of nuclear material into the U.S.; See "Could Worse be Yet to Come?" *Economist*, November 1, 2001.

¹⁸⁷ Gurr and Cole, *New Face of Terrorism*, p. 59, quoting Phil Williams.

improving. Despite such positive developments, this does not obviate the possibility that the requisite materials will find their way to terrorist groups, some of which have expressed a definite interest in acquiring them.¹⁸⁸

Production

Requirements

Since it is almost inconceivable that any terrorist group could (or would) produce its own fissile material, this step begins with previously-acquired fissile material that has to be adapted to the form required by the particular design chosen by the group. Terrorists are most likely to pursue a crude “gun-type” device, which requires relatively less in the way of testing and precision than other designs, although more advanced designs (implosion weapons) could conceivably be considered.¹⁸⁹ Depending on the form and source of the acquired fissile material, this step could involve: safely extracting the material from its current housing, machining the uranium or plutonium to the required dimensions, constructing a new weapon housing and safely storing the developed weapon core without detection until it can be weaponized. The dangers to personnel working on these devices include exposure to radiation,¹⁹⁰ the chemical toxicity of the substances used and the possibility of a conventional explosion when extracting fissile material from a device that contains high-explosives.

Extent to which these requirements are likely to be met

Many writers discount the possibility of almost any non-state actor being able to perform the above tasks, and maintain that the technical requirements are just too demanding.¹⁹¹ Some authors do however consider the possibility that a well-funded, technically adept terrorist group with significant time and effort may be able to overcome these challenges.¹⁹²

Weaponization and Delivery

Requirements

The metallurgical and engineering aspects of putting together a working nuclear weapon are often ascribed a high degree of difficulty in the open-source literature, which understandably provides very few details about the specifics of this process. In the broadest possible terms, a “gun-type” weapon involves propelling one piece of sub-critical uranium into another at high velocity to form a critical mass, whereas implosion weapons require a precisely coordinated detonation of high-explosive to compress the fissile core into a critical state. Although both types require precise machining and engineering, implosion devices are believed to be far more

¹⁸⁸ See Chapter 4.

¹⁸⁹ The assumption here is that any group pursuing the nuclear option this far would necessarily have gathered significant resources and expertise already that might enable the consideration of more advanced designs.

¹⁹⁰ Although the danger is minimized with fissile material in processed form.

¹⁹¹ Ford, “Radiological Dispersal Device,” p. 5; Jacobs, “The Nuclear Threat as a Terrorist Option,” pp.152-153. Jacobs asserts that it would be especially unlikely that terrorists would be able to utilize the fissile materials from a recovered weapon. p. 152.

¹⁹² Shaper, “Nuclear Terrorism;” Ferguson, et. al., *Four Faces of Nuclear Terrorism*.

difficult to achieve a successful yield with.¹⁹³ As far as testing is concerned, although advanced weapons designs require some degree of testing (especially the high-explosive elements), the mechanics of a crude device are so well-known that testing would probably be unnecessary. Furthermore, once a nuclear weapon is ready, there is no need for complicated delivery systems short of transporting the device to the area surrounding the target.

Extent to Which These Requirements are Likely to be Met

While this step is not explicitly described in the literature surveyed, the primary obstacle to terrorists achieving a nuclear weapons capability is still believed to be the acquisition of sufficient fissile material. Once this is achieved, the remaining technical challenges are probably within the reach of well-resourced, technologically-capable groups. The only remaining obstacle then becomes moving the device to the target area, which depends very much on levels of target protection, surveillance, and so forth.

WMD Capability Desiderata

The Issue of State Sponsorship

States have a long history of creating, supporting, manipulating, and directing insurgent and other violent non-state groups in order to further their regime's foreign or domestic policy interests. Many of the same states with a history of providing logistical, moral and financial support to terrorists are also those that are suspected or known to have dabbled with WMD. Included within this group are states such as Iran, Pakistan, Libya and North Korea. A matter of grave concern to many analysts is the possibility of state support for terrorism extending into the realm of unconventional weapons. This envisaged support could range from logistical and technical assistance for a terrorist group's own WMD program, to the worst-case scenario in which a state bestows upon its terrorist proxies a working weapon. Needless to say, such a move would vitiate many (if not all) of the requirements discussed above. This would be especially significant in the case of nuclear weapons, where a state could provide a terrorist group with a far more powerful weapon than they could ever hope to develop themselves.

Scholars seem to be divided on the likelihood of this occurring. One school of thought believes this eventuality to be highly improbable, adducing the consequences for the sponsor in terms of both the targeted state's retribution and international opprobrium, together with the fact that most states would be reluctant to place control of such powerful weapons in the hands of a sub-state group, no matter how strong the ideological ties between them. The second school of thought counters that in cases in which leaders feel a sense of desperation, or if they believed they could conceal their contribution, then some degree of assistance to terrorists with obtaining a WMD capability would be possible.¹⁹⁴ Certain agents by their very nature make a determination of their origins extremely difficult.¹⁹⁵ Prudence therefore dictates, at least in the cases of state sponsors of terrorism which are known or suspected of involvement with WMD,

¹⁹³ If the group's calculations are incorrect and a non-fission "fizzle" results, the most that can be expected is that the device will disperse radioactive materials (effectively acting as an RDD).

¹⁹⁴ See, for instance, Tucker and Sands, "An Unlikely Threat"; Cordesman, "Defending America," p. 37; and Stern, *Ultimate Terrorists*, p. 49.

¹⁹⁵ Stern, *Ultimate Terrorists*, p. 77.

that this possibility should be considered. A potential deterrent against such behavior would be for states like the U.S. to announce ahead of time that in the event of the terrorist use of WMD against its citizens, any evidence of another state's involvement will result in immediate and consequential reprisals.

Attacks Against Facilities

There is one type of attack that differs markedly from the remainder of our discussion, but since many regard this type of attack as entailing the use of a WMD, it warrants mention. We are referring here to attacks on existing facilities (the most commonly mentioned in this regard are nuclear and chemical-related facilities). Schaper notes the vulnerability of nuclear power plants to attack via airplane¹⁹⁶ and Jacobs¹⁹⁷ quotes C.V. Chester, who identifies four categories of possible terrorist acts against nuclear facilities:

1. "Theft of fissionable material (for fabrication into a 'nuclear explosive')."
2. Sabotage of a reactor, 'leading to a meltdown.'
3. Off-site contamination incidents (e.g. attack on a spent-fuel shipment).
4. On-site damage or destruction with off-site contamination excluding the reactor, but including waste tanks, cooling towers, etc."¹⁹⁸

An attack on a nuclear facility has recently been estimated to require a well-funded and well-armed group, though not nearly as well-organized as a group seeking to obtain or build nuclear weapons or INDs.¹⁹⁹ A commando-style attack on a nuclear facility or shipment would probably need no more than moderate financial resources, but in most cases it may require insider cooperation.²⁰⁰ Potter et. al. also state that a suicide attack on a nuclear reactor or waste fuel dump would require the special training of pilots so they would be able to hit the facility directly.²⁰¹ In light of these modest requirements, it would seem that many groups would be capable of successfully engaging in this type of attack. Indeed, while Jacobs dismisses category 1 above as "a low probability event," he sees 2-4 "as not only within the realm of possibility, but within the reach of almost any reasonably-organized terrorist group,"²⁰² with reactor sabotage being an especially likely mode of terrorist attack. Since nuclear facilities are believed to be far more scarce and far better protected than chemical facilities, a logical corollary to the above would appear to be that attacks on chemical (and perhaps even biological, although this has not to our knowledge ever been considered in the open literature) facilities would require at most the same scale of resources to attack successfully.

¹⁹⁶ Kelle and Schaper, "Terrorism using Nuclear and Biological Weapons," pp. 29-30.

¹⁹⁷ Jacobs, "Nuclear Threat as a Terrorist Option," p. 155.

¹⁹⁸ Chester, "Estimates of Threats to the Public from Terrorist Acts Against Nuclear Facilities," *Nuclear Safety* 17 (Sept.-Oct. 1976), pp. 659-665

¹⁹⁹ Ferguson, et. al., *Four Faces of Nuclear Terrorism*, pp. 34-37.

²⁰⁰ *Ibid.*

²⁰¹ *Ibid.*

²⁰² Jacobs, "Nuclear Threat as a Terrorist Option," pp. 155-156.

Evidentiary Analysis

A brief note is appropriate on the methodological approaches used in the literature. Most of the arguments proffered are based on hypotheses that often reference only previous secondary sources. In many cases, writers provide anecdotal evidence for their contentions, and seem to focus on a few prominent cases (predominantly that of Aum). Occasionally, writers base their assertions on technical reports, but these are usually extrapolated from other contexts in order to reach conclusions about terrorism. There are comparatively few large-*N* studies or references, a handful of case studies, and almost a complete absence of formal modeling of terrorist capabilities. The importance of utilizing available data was highlighted in the congressional testimony of John V. Parachini: "Far too many policymakers and researchers rendering assessments about terrorist use of unconventional weapons focus on what they imagine terrorists could do, not on what they have done in the past, which leads them to substitute their thinking for that of the terrorists. Acknowledging that history is not a perfect guide to the future and that government has a responsibility to take precautions against even unlikely eventualities, there must be some baseline, some historical context in order to consider potential eventualities."²⁰³

²⁰³ John V. Parachini, "Combating Terrorism: Assessing the Threat, Risk Management, and Establishing Priorities," Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of Representatives. July 26, 2000, p. 6.

Chapter 4: The Future WMD Terrorist Threat*

One of the peculiar and indeed unfortunate characteristics of the scholarly and policy-oriented literature dealing with the threats posed by terrorist use of WMD is the astonishing frequency with which the same speculative, unsubstantiated interpretations are continually being recycled. To some extent this is a blessing in disguise, because it is in large part a byproduct of the fact that there have been relatively few prior cases of CBR terrorist attacks, most of which were not particularly effective, and no actual cases of WMD terrorism.²⁰⁴ As David C. Rapoport has noted, one of the reasons why this issue seems to be “so difficult to discuss” is that “one cannot say much that is either new or certain about the matter, partly because there have been so few incidents, and we know so little about those events.”²⁰⁵ Whatever the reason, the fact remains that scholars and policymakers have more or less reached an interpretive impasse when it comes to assessing potential WMD terrorist threats. Until more such events take place or – preferably! – more in-depth research has been conducted on the motivations and capabilities of particular terrorist groups, there is probably very little that is truly new or stunningly insightful which can be added to the existing corpus of literature.

The question that really concerns observers is whether a hostile act of WMD terrorism on U.S. soil is inevitable. Oddly enough, although terrorism specialists often claim that everyone else has an alarmist view of this threat, which may well be true of government bureaucrats trying to secure new sources of funding, journalists hoping to attract readers, and a lay public desperately seeking reassurance,²⁰⁶ the reality is that they themselves are basically in agreement with one another. Most experts have concluded that WMD terrorism does not constitute an imminent or catastrophic threat, and indeed they often complain that too much money is being misallocated to consequence management and other poorly-designed anti-terrorist measures on the basis of unlikely “worst-case” scenarios.²⁰⁷ Having recognized the difficulties involved both in obtaining nuclear devices and properly weaponizing biological agents, they have generally come to view CBRN attacks as “low probability, high consequence” threats. Yet ironically, they too seem to be concerned primarily with the very types of worst-case scenarios that they accuse others of exaggerating the likelihood of, if only to minimize them. In actuality, however, future CBR attacks are better characterized as “high probability, low consequence” threats, since they will

* This chapter was written primarily by Jeffrey M. Bale.

²⁰⁴ The cases of the attack by Dahm Y’Israel Nokeam (DIN: Avenging Israel’s Blood) on a German POW camp in 1946, Aum Shinrikyo’s 1995 Tokyo subway sarin release, and the so-called “anthrax-letter” mailings of 2001 come closest to constituting bone fide WMD terrorist attacks, although thankfully none of these fulfill all the criteria for WMD terrorism. For more on the first case, see Ehud Sprinzak and Idith Zertal, “Avenging Israel’s Blood (1946),” in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, ed. by Jonathan B. Tucker (Cambridge, MA: M.I.T., 2000), pp. 17-41.

²⁰⁵ “Terrorism and Weapons of the Apocalypse,” *National Security Studies Quarterly* 5:3 (Summer 1993), p. 49. Fortunately, since the time that Rapoport made these observations, we now know a good deal more about some of the most significant CB events. See especially Tucker, ed., *Toxic Terror*, passim.

²⁰⁶ Idem and Amy Sands, “An Unlikely Threat,” *Bulletin of the Atomic Scientists* 55:4 (July-August 1999), p. 47; Ehud Sprinzak, “On Not Overstating the Problem,” in *Hype or Reality?: The “New Terrorism” and Mass Casualty Attacks*, ed. by Brad Roberts (Alexandria, VA: Chemical and Biological Arms Control Institute, 2000), pp. 3, 9-11.

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probably take the form of relatively crude, low-level attacks with toxic chemicals or radiological materials.²⁰⁸ For this very reason, the authors of this report believe that CBR terrorist attacks on the U.S. are inevitable. The only questions are 1) when – not if – they might occur, and 2) whether they will be sufficiently catastrophic to constitute true WMD terrorism.

When assessing the nature and extent of the future threat posed by CBRN terrorism, one must first make some crucial preliminary distinctions. First, one must distinguish between 1) those terrorist acts that are most likely to occur in the near term, and 2) those that are the most (potentially) catastrophic despite their relative infrequency. Second, as the late Ehud Sprinzak has rightly emphasized, it is absolutely necessary to distinguish analytically between four distinct categories of terrorism, categories that have all too often been carelessly lumped together:

- mass casualty terrorist attacks by non-state actors using conventional weapons;
- overt or covert state-sponsored CBRN terrorist attacks;
- small-scale CBR terrorist attacks by non-state actors; and
- “superterrorism,” i.e., “the strategic use by non-state organizations of [CBRN] to bring about a major disaster, with death tolls ranging in the tens or hundreds of thousands...”²⁰⁹

Although this report’s focus has officially been on this last category, i.e., WMD terrorism proper, and has specifically focused on unconventional weapons and non-state actors (thereby only touching upon the first and second of the above four categories), one cannot ignore type three in a proper analysis of potential threats involving CBRN weapons, since these are precisely the ones that are most likely to be carried out.

On the capabilities side of the equation, there is little doubt that a technologically and organizationally capable terrorist group could at some point succeed in acquiring, manufacturing, and delivering a CBRN weapon capable of causing mass casualties and/or mass destruction. Moreover, this possibility is almost certainly increasing, since as noted in Chapter 3 terrorists are increasingly able to acquire relevant CBRN weapons-related knowledge and skills, international and national controls are presently insufficient to keep most types of WMD raw materials out of the hands of terrorists and other non-state actors, and several existing groups appear to have the financial resources to be able to fund a WMD program. At the same time, the diverse nature of various types of CBRN weapons in practice means that terrorist groups will require significantly different levels of expertise to be able to develop each of them. Scientists generally agree that it is most difficult for non-state actors to acquire fissile material and a nuclear weapons capability (although this is certainly not outside the realm of possibility),²¹⁰ that biological seed stock and

²⁰⁸ Tucker and Sands, “An Unlikely Threat,” p. 52.

²⁰⁹ Sprinzak, “On Not Overstating the Problem,” p. 9. Compare also Brad Roberts, “Conclusion: The Prospects for Mass Casualty Terrorism,” in *Hype or Reality?*, pp. 266-7.

²¹⁰ One exception to this is Annette Schaper, who avers that nuclear attacks are a “more suitable next step” for terrorists than large scale biological attacks, “unless terrorists can manage to produce and effectively spread a pathogen that causes infectious disease and, therefore, an epidemic.” See Alexander Kelle and Annette Schaper, “Terrorism using Nuclear and Biological Weapons: A Critical Analysis of Risks after 11 September 2001,” Peace Research Institute Frankfurt (PRIF), *PRIF Reports* 64, p. 32. She recognizes that the creation of a nuclear device by terrorists requires an enormous effort, yet claims that “revelations over the preparations undertaken for the attacks against the World Trade Center show that terrorists are prepared to go this far to achieve their aims.” *Ibid*, p. 19.

radiological materials fall somewhere in the middle, and that chemical weapons precursors are the most easily obtainable WMD raw materials.²¹¹ As a general rule, it can be said that the greater the desired scale of the projected attack, the more difficult the process of weaponizing CBRN agents becomes. Hence Nadine Gurr and Benjamin Cole are right to point out that “it cannot be assumed that any terrorist group will be able to develop [nuclear, biological, and chemical] weapons as soon as it puts its mind to it.”²¹² In terms of technologically-based probabilities, they conclude that “the most likely threats are [from] CBW with poor delivery mechanisms, which are primarily usable only as contaminants. The development of WMD capable of causing extremely large levels of casualties is the least likely to emerge.”²¹³

Keeping these technical capabilities and limitations in mind, and shifting now to motivations, we believe that the most imminent potential CBRN terrorist scenario would be the carrying out of a crude CW attack in a public place or an RDD detonation by a terrorist cell linked to al-Qa`ida or one of the other operationally sophisticated Islamist groups, e.g., veteran Egyptian and Algerian terrorist organizations.²¹⁴ The next most likely scenario would be the carrying out of a crude chemical agent attack or a minor biological contamination incident by small, relatively isolated autonomous cells or disgruntled “lone wolves” associated loosely with the right-wing American “militia” movement. Certain apocalyptic millenarian religious cults, the violent fringes of the anti-abortion movement, or even the most extreme and violence-prone cells of eco-radicals may also pose future threats in this regard. The worst-case scenarios of WMD terrorism, which will probably eventually materialize even if they do not occur in the short run, would be the effective dispersal of a properly aerosolized biological pathogen or nerve agent, or the detonation of a nuclear device in an American city.²¹⁵ Here again the most likely non-state perpetrators would be members of an operationally sophisticated Islamist terrorist group, but in this context there is also the possibility of an underemployed or unemployed bioweapons expert conducting the former operation, whether out of spite or for money, or of acts of covert state-sponsored terrorism carried out by special operations personnel from, say, increasingly desperate “rogue regimes” such as those of North Korea or Iran.

What is most disturbing is the seeming undeterrability of such large-scale CBRN attacks, especially those planned by certain types of non-state actors or by hostile regimes whose fanatical leaders manage to convince themselves that they can successfully conceal or disguise their involvement. If we consider, for example, the various methods identified by Michael J. Powers for deterring terrorism with CBRN – denial measures, defensive measures, and punitive

²¹¹ Compare Bernard Lewis, “License to Kill: Usama bin Ladin's Declaration of Jihad,” *Foreign Affairs* 77: 6 (November-December 1998), p. ?; and Nadine Gurr and Benjamin Cole, *The New Face of Terrorism: Threats from Weapons of Mass Destruction* (London: I. B. Tauris, 2002), p. 56.

²¹² *Ibid*, p. 73.

²¹³ *Ibid*, p. 74.

²¹⁴ Indeed, the recent series of interdicted Islamist “toxic terror” plots in Europe provide clear evidence that such groups have been seriously planning to carry out low-level attacks with chemical agents. For a summary of one such case, see Jeffrey M. Bale et al, “Ricin Found in London: An al-Qa`ida Connection?” CNS Report, January 23, 2003, at: <http://cns.miiis.edu/pubs/reports/ricin.htm>. Nor is Europe the only place where such plots have been hatched. A similar effort in Amman involving Abu Mus`ab al-Zarqawi's network was apparently forestalled by Jordanian security forces.

²¹⁵ This latter possibility may not be as unlikely as some experts seem to think. See Joe Trento, “Assuming al-Qaeda [sic] is a Nuclear Power,” Public Education Center, March 2, 2004: www.publicedcenter.org/stories/trento/2004-03-02.

measures – there is little reason to be sanguine.²¹⁶ Denial measures, “the steps that can be taken to retard or prevent the acquisition of CBRN weapons, materials, equipment, and expertise by the terrorist,” can never be more than partially effective given the large pool of impoverished scientists formerly employed in state-sponsored weapons programs, the ever-increasing diffusion of information related to CBRN, the growing number of extremists with a scientific background, the covert attempts by many states to acquire these technologies, the existence of networks of unscrupulous entrepreneurs and middlemen, the “dual-use” nature of much CBRN equipment and material, the increasing terrorist interest in obtaining CBRN, and the decidedly mixed record of past denial efforts. Defensive measures, the steps that can be taken to deter terrorists by convincing them that the effects of using such weapons can be substantially mitigated, are also unlikely to be effective. The panic that has already ensued in the wake of previous incidents in which biological or chemical agents were disseminated, and the periodic attention given by the Western media to the inadequacy of our existing emergency response measures for dealing with CBRN attacks, can hardly serve to deter would-be CBRN terrorists. Quite the contrary. (At the very least, more strenuous efforts should be made in advance to “psychologically inoculate” the public.) Finally, punitive measures, the steps that can be taken to assure the destruction or severe punishment of any terrorists that acquire or employ such weapons, are unlikely to persuade certain types of extremist groups and states that it would really be suicidal for them to carry out CBRN attacks.

This last matter deserves further explication, even though some of the attendant problems have already been alluded to in Chapter 2. As noted above, punitive deterrence is much more likely to be effective vis-à-vis terrorist groups and hostile regimes which occupy a delimited territory that can be easily retaliated against. Even in such cases, however, deterrence may not always be effective. For example, during the 1980s, the newly-established Islamic Republic of Iran was not deterred from training, equipping, supplying, and facilitating (if not covertly but actively sponsoring) its client Hizballah’s conventional mass casualty terrorist attacks against US and other Western targets in Lebanon, even though in doing so it risked precipitating severe retaliation. The mullahs took a calculated risk that Western countries would not react in such an extreme fashion, and they were right. Of course, carrying out a CBRN attack on U.S. soil would be far more likely to provoke a massive retaliation against the responsible parties. The problem is that such an attack could be covertly launched by a terrorist group or a hostile state’s special operations personnel, and if we were unable to determine its sponsors or perpetrators with apodictic certainty we would be effectively unable to retaliate massively or assure their subsequent destruction. The fact that the perpetrator(s) of the 2001 *B. anthracis* letter mailings has yet to be identified can only serve to encourage other parties to perpetrate similar actions insofar as they are able to convince themselves that they too can get away with it. In short, even potentially vulnerable enemies may risk carrying out a CBRN attack in the U.S. if they believe that they can successfully conceal their own involvement and thereby avoid retaliation. Sadly, they may well be able to do so, especially if certain types of biological or chemical agents are employed.

Even more worrisome are the diffuse, transnational terrorist networks that we cannot completely destroy in the wake of a WMD attack, no matter how much we may wish to. There is simply no way for us to eradicate all the members of a group like al-Qa`ida because of their geographical

²¹⁶ Michael J. Powers, “Deterring Terrorism with CBRN Weapons: Developing a Conceptual Framework,” *CBACI Occasional Paper 2*, February 2001, pp. 13-19.

dispersal, organizational fluidity, and frequently hidden identities. This has to do with the multi-level nature of its network of members and supporters. Al-Qa`ida has never been a centralized, military-style cellular organization with a well-defined hierarchical command structure, but rather a loose, hybrid network consisting of four overlapping levels: 1) a strategic directorate under the direct control of Bin Ladin and his chief lieutenants, which is internally divided into diverse functional spheres; 2) a few hundred lower level members taking their orders directly from the strategic directorate, who effectively constitute the rank-and-file of al-Qa`ida proper; 3) several thousand people from other terrorist groups or factions thereof that have affiliated with al-Qa`ida and/or actively collaborated with it, in some cases temporarily, but which also have their own peculiar national or regional agendas (e.g., certain Egyptian and Algerian groups, Jemaah Islamiyah, Ansar al-Islam); and 4) tens of thousands of Islamist radicals throughout the world who are increasingly inspired by the romantic image of Bin Ladin and the radical jihadist doctrines he promotes to carry out attacks on their own initiative, and who sometimes even claim responsibility after the fact for al-Qa`ida, but who in fact have no direct affiliation with his directorate or organizational nexus, from which they have not received any actual orders.²¹⁷ (Parenthetically, it may well be these unaffiliated cells of extremists who are most prone to want to carry out mass casualty terrorist attacks, possibly using CW or BW agents or crude RDDs, attacks that might be virtually impossible to predict, much less forestall. At the same time, however much they may be inclined to carry out such attacks, they may well lack the wherewithal to do so.) Moreover, since this network is regularly undergoing a kaleidoscopic process of fission and fusion, it effectively constitutes a protean, ever-shifting, rapidly-moving target rather than a fixed target that is easy to hit. On top of this, it incorporates many individuals who are willing to engage in suicidal martyrdom operations because they are convinced that they will immediately attain other-worldly rewards.

Perhaps the inherent difficulties of retaliating against al-Qa`ida could be mitigated if it were possible to negotiate some sort of political settlement or permanent ceasefire with the group's leaders. Unfortunately, Bin Ladin and other radical proponents of global jihad insistently pursue utopian, non-negotiable, and unappeasable goals that cannot possibly be reached. Although their *proximate*, near-term objectives – the replacement of various “apostate” regimes throughout the Muslim world with rigidly Islamic states, the destruction of Israel, and the withdrawal of all “infidel” forces from the Middle East – are in theory possible to achieve or negotiate, their *minimal* long-term goals – the recovery of all the territories that were once under the control of Muslim powers, from Spain (al-Andalus) to the Balkans to Turkestan to northern India – are not. Even less conceivable is the attainment of their *maximal* long-term goals – the Islamization of the entire world and the establishment of a single, united Muslim community (*umma*) ruled by the *shari`a*.²¹⁸ What this means in practice is that no matter what actions we take or do not take, they

²¹⁷ For an insightful critique of the simplistic and erroneous notions that 1) al-Qa`ida constitutes a single organization, or that 2) transnational Islamist terrorism is all being coordinated by Bin Ladin, see Jason Burke, *Al-Qaeda: Casting a Shadow of Terror* (London and New York: I. B. Tauris, 2003), especially pp. 12-17.

²¹⁸ The whole question of Islamist and jihadist objectives is far more complicated than can be indicated adequately here. Apart from the fact that every Islamist group – and indeed every global jihadist group – is somewhat different, one has to take into consideration the frequent disparity between rhetoric and reality. This is true in both directions. Sometimes overheated religious rhetoric is employed as a cover for the pursuit of relatively restrained, pragmatic, and perhaps even cynical or materialistic objectives, whereas in other cases moderate rhetoric is used to disguise an extremely radical utopian, theocratic, and frankly imperialistic agenda. The latter tendency is particularly noticeable when one compares the Arabic- and English-language versions of Islamist websites, or the speeches of Islamist spokesmen that are designed to

are not going to be dissuaded from attacking us. If we aggressively hunt down and destroy their operational and logistical cells, they will clamor for and patiently plot their revenge, and if we refuse to take decisive actions against them they will only view this as another sign of our weakness and decadence. Hence there is no real prospect of deterring future attacks from this quarter short of eliminating every violent Islamist, and at some point those that are not killed will almost certainly resort to launching CBRN attacks, catastrophic or otherwise.

Then there are the many insular, cult-like groups, several of which espouse aggressive apocalyptic millenarian ideologies. Members of these organizations are not only unlikely to be deterred by the possibility of suffering this-worldly “tribulations,” but may actually look forward to precipitating the catastrophic final battles that have been prophesied between the forces of “Good” and “Evil.” Their very anticipation may cause them to activate prearranged plans designed to smite the forces of “darkness.” Should those plans involve the use of WMD, they are not likely to be dissuaded by the likelihood of their own subsequent physical elimination, since death may be viewed as the actual engine of their desired transfer from a “corrupt” corporeal earthly plane to a “higher” spiritual plane.

Finally, there are apocalyptic or revenge-seeking “lone operators.” As Jeffrey D. Simon has pointed out, such individuals have often been innovators, are less liable to be constrained by peer pressure than persons affiliated with organized groups, and are more likely than terrorist groups to remain completely below the radar screens of intelligence agencies before they emerge to carry out a CBR attack.²¹⁹ If people of this sort are motivated by utopian political or religious doctrines or by sheer hatred rather than purely instrumental aims such as extortion, they may have no qualms whatsoever about employing CBR to punish their enemies and thus be correspondingly hard to deter, and if they have the requisite financial resources and technical abilities, they might well constitute a serious danger. Within this category the greatest threat probably stems from disgruntled former weapons experts who have the ability either to aerosolize biological agents properly or to activate radiological and nuclear devices. On the positive side, lone operators face formidable resource and technical hurdles in developing CBRN agents to the point where they could be used as a WMD.

In sum, the very non-state groups and persons that are most likely to carry out a WMD attack on US soil are arguably the hardest to deter and – in the case of transnational networks – also the

mollify and mislead Western audiences and those that they give, often secretly, to their supporters and believers. For several examples of this pattern of dissimulating and disseminating “dual messages,” see Anonymous [Rita Katz], *Terrorist Hunter: The Extraordinary Story of a Woman who went Undercover to Infiltrate Radical Islamic Groups* (New York: Ecco, 2003); and Stephen Emerson, *American Jihad: The Terrorists Living Among Us* (New York: Free Press, 2003), both *passim*. What can be said with certainty is that inflammatory firebrands like Shaykh ‘Umar Bakri Muhammad of the London-based al-Muhajirun (Émigrés) organization, however ludicrous they may at times appear to be, are nevertheless fairly representative of the extreme maximalist views regarding the coming Islamization of the world that are held by many global jihadists. For more on Bakri Muhammad, whose organization is apparently a front for al-Hizb al-Tahrir al-Islami, see Dominique Thomas, *Le Londonistan: La voix du djihad* (Paris: Michalon, 2003), pp. 97-100, 186-97; and Jon Ronson, *Them: Adventures with Extremists* (New York: Simon & Schuster, 2002), pp. ?, for a snide account. Compare Daniel Pipes, “The Islamic States of America?” *Front Page Magazine*, Sept 23, 2004.

²¹⁹ Jeffrey D. Simon, “Lone Operators and Weapons of Mass Destruction,” in *Hype or Reality?*, pp. 70-2.

hardest to eliminate.²²⁰ It is precisely for this reason that we believe that CBRN terrorist attacks in the U.S. are inevitable. No matter how infrequent they may be, or how many we are able to prevent, at least one or two successful large-scale attacks of this type are bound to occur eventually. Hence we can not afford to ignore, or fail to plan for, all CBRN possibilities, ranging from relatively crude chemical, biological, or radiological attacks that cause minimal material damage (but are nonetheless bound to have a significant psychological impact) to catastrophic WMD attacks that may cause massive damage and loss of life. Despite the vested public and private interests that are surely involved in exaggerating the threat of WMD terrorism to push for increased expenditures and thereby obtain funding, and the obvious need to allocate available resources wisely, to do anything less would be grossly negligent. The American people are unlikely to forgive their government a second time for failing to take the necessary measures to prepare for a catastrophic terrorist attack, whether or not it involves the use of CBRN weapons.

Last but not least, it needs to be emphasized that there is no way to predict future WMD attacks with any degree of scientific certainty. In many ways the threat of WMD terrorism resembles a chaotic system, in the strict sense of the term, wherein tiny perturbations in any of a myriad of factors can result in significantly disparate outcomes. Many analysts seem to believe that they can devise a “magic bullet” in the form of a sophisticated model that will allow Western security agencies to predict when particular terrorist groups are likely to carry out such attacks, and for this reason the U.S. government expends billions of dollars every year subsidizing mathematical modeling projects that purport to be able to quantify and predict terrorist behavior, track the way in which terrorist networks develop, and the like. In our opinion, an exclusive focus on these types of efforts reflects a naïve and largely misplaced faith in the ability of modern “social scientific” methods to predict complex human behavior patterns, both on the individual and the group (or aggregate) levels.

On the other hand, it is clear that the traditional analytical methods of the past have served us rather poorly in predicting terrorist behavior – the failures in foreseeing such attacks as the 1995 Tokyo subway sarin release or the 9/11 attacks were not solely the result of faulty intelligence. They were also in many ways the consequence of a lack of imagination and innovation in thinking about such threats.

What is required instead is a synthesis – a marriage of the quantitative and the qualitative, the model and the empirical “actual.” To better understand the behavior of “really-existing” terrorists we need to conduct in-depth qualitative studies of a wide range of actual extremist and terrorist groups, studies that give due attention to their complex sociopolitical context and carefully examine and reconstruct their historical origins, their development over time, their organizational structure, their membership, their ideological worldviews, their operational techniques, their technical capabilities, and their actual attacks.²²¹ We then need to combine this

²²⁰ A similar but more general argument has also been made by the CIA’s former CTC deputy chief Paul R. Pillar in *Terrorism and U.S. Foreign Policy* (Washington, DC: Brookings Institution, 2001), p. 104: Deterrence from military retaliation “is likely to be limited at best...[since] the terrorists most likely to threaten U.S. interests present few suitable military targets, especially high-value targets whose destruction would be very costly to the terrorists....With smaller or more transient [Islamist] groups...there are no suitable military targets at all.”

²²¹ At least six months would be required for a given researcher to examine any specific organization thoroughly, but there really is no substitute for acquiring a detailed knowledge of terrorist group

empirical information with a new set of analytical tools, be they computational, statistical, or merely heuristic, in order to reach a level of understanding that is both specific to the dangers of the group under consideration and comparative enough to discern valuable trends and indicators that would otherwise go unnoticed.²²²

As Sprinzak has argued,

the vast majority of terrorist organizations can be identified well in advance...and the number of potential [WMD] suspects is significantly less than doomsayers seem to believe. Ample early warning signs should make effective interdiction of potential superterrorists much easier than today's prevailing rhetoric suggests.²²³

Furthermore, Gurr and Cole have observed that "it is not through technical indicators that clandestine programs will be identified, it is by monitoring the groups, and then interpreting their observed actions."²²⁴ To provide only one example, a serious investigation of Aum Shinrikyo – which several Japanese newspapers did in fact carry out – should have been more than sufficient to alert domestic and international authorities to the dangers posed by the organization.²²⁵ If those warnings had been heeded and promptly acted upon, the 1995 sarin attack in the Tokyo subway could undoubtedly have been headed off.

In the context of WMD terrorism it really is true that an ounce of prevention is worth 1000 pounds of cure. Even so, since there can never be perfect foreknowledge of – or total security against – terrorist attacks, whether these are carried out with CBRN or conventional weapons, we cannot afford to discount catastrophic worst-case scenarios even if they are much less likely to materialize.

motivations and capabilities the hard way. As Brad Roberts rightly warns, "stray insights, half-truths, [and] anecdotal information about the past, or ignorance of it seem not ultimately to be very helpful for answering the hype-or-reality question. A more systematic approach is necessary." See "Conclusion: The Prospects for Mass Casualty Terrorism," p. 265. (We would add "comprehensive" to "systematic" in terms of the approach that is needed.) But he also cautions that the historical record alone, especially when it is "so sparse and so political...makes a brittle foundation for a national counterterrorism strategy." *Ibid*, p. 269.

²²² Such a relatively paltry allocation of resources would be remarkably cost effective if it permitted us to prevent even a single future WMD attack, and there is every reason to suppose that it would.

²²³ Sprinzak, "On Not Overstating the Threat," pp. 5-6. Nevertheless, Brian Jenkins is right to emphasize that historical analysis provides no certain basis for forecasting catastrophic terrorism involving CBRN, in part because the behavior of religious fanatics and lone operatives is difficult to predict. Hence "we can have no confidence that we will know anything in advance," at least in particular cases. See "The WMD Terrorist Threat – Is There a Consensus View?," in *Hype or Reality?*, pp. 242, 245.

²²⁴ Gurr and Cole, *New Face of Terrorism*, p.73.

²²⁵ For a devastating critique of the inaction of Japanese authorities – and of the naïve apologetics proffered by certain New Religious Movement scholars – in connection with the Aum affair, see Ian Reader, "Scholarship, Aum Shinrikyo, and Academic Integrity," *Nova Religio* 3:2 (April 2000), pp. 368-82.

Bibliography

Abu-Rabi, Ibrahim M. *Intellectual Origins of Islamic Resurgence in the Modern Arab World*. Albany: SUNY, 1996.

Ackerman, Gary, Jason Pate, and Kimberly McCloud. "2000 WMD Terrorism Chronology: Incidents Involving Sub-National Actors and Chemical, Biological, Radiological, or Nuclear Materials," *CNS Reports*, The Center for Nonproliferation Studies. (April, 30, 2001).

Ackerman, Gary and Laura Snyder. "Would they if they could?" *Bulletin of the Atomic Scientists* Vol. 58, No. 1 (May/June 2002).

Ackerman, Gary, Jeffrey M. Bale, and Kimberly McCloud. "Chart: Al-Qa`ida's WMD Activities." (December 22, 2002). cns.miis.edu/pubs/other/sjm_cht.htm.

Ackerman, Gary and Jason Pate. "Assessing the Threat of Mass-Casualty Bioterrorism" Issue Brief, Nuclear Threat Initiative. (March 2003).

Albright, David, Kathryn Buehler, and Holly Higgins. "Bin Laden and the Bomb." *Bulletin of the Atomic Scientists* Vol. 58, No. 1 (January/February 2002).

Albright, David, Cory Hinderstein, and Holly Higgins. "Does Al Qaeda have Nuclear Materials? Doubtful, But," Institute for Science and International Security. (March 1, 2002).

Albright, David, "Al Qaeda's Nuclear Program: Through the Window of Seized Documents," *Policy Forum Online*, The Nautilus Institute, Special Forum 47. (November 6, 2002).

Alexander, Yonah and Paul Leventhal, Eds. *Preventing nuclear terrorism: the report and papers of the International Task Force on Prevention of Nuclear Terrorism*. Lexington, MA: Lexington Books, 1987.

Allison, Graham. "Could Worse be Yet to Come?" *Economist*, November 1, 2001.

Allison, Graham. *Nuclear Terrorism*. New York: Times Books, 2004.

Alvarez, Robert. "What About the Spent Fuel?" *Bulletin of the Atomic Scientists* Vol. 58, No. 1 (January/February 2002).

Anonymous [Rita Katz]. *Terrorist Hunter: The Extraordinary Story of a Woman who went Undercover to Infiltrate Radical Islamic Groups*. New York: Ecco, 2003.

Arquilla, John, Ian O. Lesser, Bruce Hoffman, David F. Ronfeldt, Michele Zanini, and Brian Michael Jenkins. *Countering the New Terrorism*. Santa Monica, CA: Rand, 1998.

Atack, Jon. *A Piece of Blue Sky: Scientology, Dianetics, and L. Ron Hubbard Exposed*. New York: Carroll, 1990.

Baker, Michelle and Margaret Kosal. "Osmium Tetroxide – a New Chemical Terrorism Weapon?" *CNS Research Story*, The Center for Nonproliferation Studies (March 30, 2004).

Bale, Jeffrey M. "The Cult Wars, Part I," *Hit List* Vol. 2, No. 4 (January-February 2001).

Bale, Jeffrey M, Anjali Bhattacharjee, Eric Croddy, Richard Pilch, "Ricin found in London: An al-Qa'ida Connection?" *CNS Reports*, The Center for Nonproliferation Report (January 23, 2003).

Bale, Jeffrey M, "The Chechen Resistance and Radiological Terrorism," Unpublished Report. (July 2003).

Bale, Jeffrey M, "Responses to Questions concerning CBRN Terrorism," Unpublished Report. (January 2004).

Bale, Jeffrey M. "South Africa: Overview," Nuclear Threat Initiative. www.nti.org/e_research/profiles/SAfrica/index.html.

Barletta, Michael, Jonathan B. Tucker, and Amy Sands, "Keeping Track of Anthrax: The Case for a Biosecurity Convention," *Bulletin of the Atomic Scientists* Vol. 58, No. 3 (May/June 2002).

Barletta, Michael, Ed. "WMD Threats 2001: Critical Choices for the Bush Administration," Center for Nonproliferation Studies, Occasional Paper 6 (May 2001).

Michael Barletta, Ed. "After 9/11: Preventing Mass-Destruction Terrorism and Weapons Proliferation," Center for Nonproliferation Studies, Occasional Paper 8 (May 2002).

Basrur, Rajesh M. and Hasan-Askar Rizvi, "Nuclear Terrorism in South Asia," Cooperative Monitoring Center Occasional Paper 25, Sandia National Laboratories (2002)

Beres, Louis Rene. "Israel, the "Peace Process," and Nuclear Terrorism: Recognizing the Linkages." *Studies in Conflict and Terrorism* Vol. 21, No. 1 (January-March 1998).

Benjamin, Daniel and Steven Simon. "America and the New terrorism." *Survival* Vol. 42, No. 1 (Spring 2000).

Benjamin, Daniel, Olivier Roy, Bruce Hoffman, and Steve Simon, "America and the New Terrorism: An Exchange," *Survival*, Vol. 42, No. 2, (Summer 2000).

Betts, Richard K. "The New Threat of Mass Destruction." *Foreign Affairs* Vol. 77, No. 1 (January/February 1998).

Blixen, Samuel. *El vientre del Cóndor: Del archivo del terror al caso Berríos*. Montevideo: Brecha, 1994.

Brian, Danielle, Lynn Eisenman, and Peter D. H. Stockton. "The Weapons Complex: Who's Guarding the Store?" *Bulletin of the Atomic Scientists* Vol. 58, No. 1 (January/February 2002).

Bunn, George, Fritz Steinhausler, and Lyudmila Zaitseva. "Strengthening Nuclear Security against Terrorists and Thieves Through Better Training." *The Nonproliferation Review* Vol. 8, No. 3 (Fall-Winter 2001).

Bunn, George and Fritz Steinhausler. "Guarding Nuclear Reactors and Material from Terrorists and Thieves." *Arms Control Today* Vol. 31, No. 8 (October 2001).

Bunn, Matthew, "The Next Wave: New Steps to Control Warheads and Fissile Material," A Joint Publication of the Harvard University's Project on Managing the Atom and the Non-Proliferation Project at the Carnegie Endowment for International Peace (April 2000).

Burke, Jason. *Al-Qaeda: Casting a Shadow of Terror*. London: I. B. Tauris, 2003.

Cameron, Gavin. *Nuclear Terrorism: A Threat Assessment for the 21st Century*. New York: Palgrave Macmillan, 1999.

Cameron, Gavin. "Multi-track Microproliferation: Lessons from Aum Shinrikyo and Al Qaida." *Studies in Conflict and Terrorism* Vol. 22, No. 4 (November 1999).

Cameron, Gavin. "WMD Terrorism in the United States: The Threat and Possible Countermeasures." *Nonproliferation Review* Vol. 7, No. 1 (Spring 2000).

Cameron, Gavin, Jason Pate, Diana McCauley, and Lindsay DeFazio. "1999 WMD Terrorism Chronology: Incidents Involving Sub-National Actors and Chemical, Biological, Radiological, and Nuclear Materials." *The Nonproliferation Review* Vol. 7, No. 2 (Summer 2000).

Cameron, Gavin and Jason Pate. "Covert Biological Weapons Attacks Against Agricultural Targets: Assessing the Impact Against US Agriculture." *Terrorism and Political Violence* Vol. 13, No. 39 (Autumn 2001).

Carter, Ashton, John Deutch, and Philip Zelikow. "Catastrophic Terrorism: Tackling the New Danger." *Foreign Affairs*, Vol. 77, No. 6 (November/December 1998).

Casagrande, Rocco. "Biological Terrorism Targeted at Agriculture: The Threat to US National Security." *The Nonproliferation Review* Vol. 7, No. 3 (Fall-Winter 2000).

Clapper, James Jr. Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of Representatives and the Subcommittee on Economic Development, Public Buildings and Emergency Management, Committee on Transportation and Infrastructure. April 24, 2001.

"Chronology of Aum Shinrikyo's CBW Activities." *CNS Reports*, The Center for Nonproliferation Studies. (2001).

"Chronology of Incidents Involving Ricin." *CNS Reports*, CNS WMD Terrorism Research Project, The Center for Nonproliferation Studies. (February 3, 2004).

Claridge, David. "Exploding the Myths of Superterrorism." *Terrorism and Political Violence* Vol. 11, No. 4 (Winter 1999).

Clutterbuck, Richard. "Trends in Terrorist Weaponry." *Terrorism and Political Violence* Vol. 5, No. 2 (Summer 1993).

Cohn, Norman. *The Pursuit of the Millennium: Revolutionary Millenarians and Mystical Anarchists of the Middle Ages*. New York: Oxford University, 1990.

Cole, Benjamin and Nadine Gurr. *The New Face of Terrorism: Threats from Weapons of Mass Destruction*. London, New York: I.B. Tauris, 2002.

"Combating Terrorism: Need for Comprehensive Threat and Risk Assessments of Chemical and Biological Attacks," General Accounting Office (GAO) Report to Congressional Requesters, September 1999

Cordesman, Anthony H. "Defending America: Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons," Center for Strategic and International Studies (23 September 2001).

Cordesman, Anthony H. "Defending America: Asymmetric and Terrorist Attacks with Biological Weapons," Center for Strategic and International Studies (24 September 2001).

Cordesman, Anthony H. "Defending America: Asymmetric and Terrorist Attacks with Chemical Weapons," Center for Strategic and International Studies (24 September 2001).

Corydon, Bent. *L. Ron Hubbard: Messiah or Madman?* Fort Lee, NJ: Barricade, 1996.

Crelinsten, Ronald D. "Terrorism and Counter-Terrorism in a Multi-centric World: Challenges and Opportunities." *Terrorism and Political Violence* Vol. 11, No. 4 (Winter 1999).

Croddy, Eric. "Anthrax: Background Report." *CNS Reports*, The Center for Nonproliferation Studies (October 10, 2001).

Daniels, Ted, ed. *A Doomsday Reader: Prophets, Predictors, and Hucksters of Salvation*. New York: New York University, 1999.

Dishman, Chris. "Understanding perspectives on WMD and Why They are Important" *Studies in Conflict and Terrorism* Vol 24, No. 4 (July 2001).

Drake, C.J.M. *Terrorists' Target Selection*. (New York: St. Marten's Press, Inc, 1998).

Dolnik, Adam. "Die and Let Die: Exploring Links between Suicide Terrorism and Terrorist Use of Chemical, Biological, Radiological, and Nuclear Weapons." *Studies in Conflict and Terrorism* (January-February 2003).

Emerson, Stephen. *American Jihad: The Terrorists Living Among Us*. New York: Free Press, 2003.

Falkenrath, Richard A, Robert D. Newman, and Bradley A. Thayer. *America's Achilles Heel: Nuclear, Biological, and chemical terrorism and covert attack*. Cambridge, MA: MIT Press, 1998.

Falkenrath, Richard A. "Confronting Nuclear, Chemical, and Biological Terrorism." *Survival* Vol. 40, No. 3 (Autumn 1998).

Falkenrath, Richard A. Karl-Heinz Kamp, Joseph F. Pilat, and Jessica Stern, "WMD Terrorism: An Exchange." *Survival* Vol. 40, No. 4 (Winter 1998-99).

Fauci, Anthony H. Testimony before the Senate Subcommittee on Labor, Health and Human Services, and Education, Senate Appropriations Committee, House of Representatives. November 2, 2001.

Ferguson, Charles, Tahseen Kazi, and Judith Perera. "Commercial Radioactive Sources: Surveying the Security Risks," Center for Nonproliferation Studies, Occasional Paper 11. (January 2003).

Ferguson, Charles, William Potter, Amy Sands, Leonard Spector, and Fred Wehling. *The Four Faces of Nuclear Terrorism*. Monterey, CA: The Center for Nonproliferation Studies, 2004.

Ferraresi, Franco. *Threats to Democracy: The Radical Right in Italy after the War*. Princeton: Princeton University, 1996.

Flamini, Gianni. *Il partito del golpe: Le strategie della tensione e del terrore dal primo centrosinistra organico al sequestro Moro*. Ferrara: Bovolenta, 1981-1985. Volume. 2.

Folb, Peter and Chandre Gould. *Project Coast: Apartheid's Chemical and Biological Warfare Programmes*. Geneva: United Nations Institute for Disarmament Research/Centre for Conflict Resolution, 2002.

Ford, James L. "Radiological Dispersal Device: Assessing the Transnational Threat." *Strategic Forum* No. 136, Institute for National Strategic Studies, National Defense University (March 1998).

Foxell, Joseph W, Jr. "The Debate on the Potential for Mass-Casualty Terrorism: The Challenge to US Security." *Terrorism and Political Violence* Vol. 11, No. 1 (Spring 1999).

Foxell, Joseph W, Jr. "Current Trends in Agroterrorism (Antilivestock, Anticrop, and Antisoil Biocultural Terrorism) and Their Potential Impact for Food Security." *Studies in Conflict and Terrorism* Vol. 24, No. 2 (April 2001).

Garrett, Laurie. "The Nightmare of Bioterrorism." *Foreign Affairs* Vol. 80, No. 1 (January/February 2001).

Garwin, Richard. "Nuclear and Biological Megaterrorism." 27th Session of the International Seminars on Planetary Emergencies (August 21, 2002).

Gilchrest, Wayne T. Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of

Representatives and the Subcommittee on Economic Development, Public Buildings and Emergency Management, Committee on Transportation and Infrastructure. April 24, 2001.

Gressang, Daniel S. IV. "Audience and Message: Assessing Terrorist WMD Potential" *Terrorism and Political Violence* Vol. 13, No. 3 (Autumn 2001).

Gunaratna, Rohan. *Inside Al Qaeda: Global Network of Terror*. New York: Berkley, 2003.

Hall, Jon R and Philip D. Schuyler, Eds. *Apocalypse Observed: Religious Movements and Violence in North America, Europe, and Japan*. London and New York: Routledge, 2000.

Heilman, Carole. Testimony before the House Committee on Government Reform, House of Representatives. November 14, 2001.

Henderson, Donald A. "The Looming Threat of Bioterrorism." *Science* Vol. 283, No. 5406 (February 26, 1999).

Hippel, Frank Von. "Recommendations for Preventing Nuclear Terrorism," *FAS Public Interest Report* Vol. 54, No. 6. (November/December 2001).

Hirsch, Daniel. "The NRC: What, me Worry?" *Bulletin of the Atomic Scientists, Scientists* Vol. 58, No. 1 (January/February 2002).

Hirsch, Daniel, David Lochbaum, & Edwin Lyman. "The NRC's Dirty Little Secret." *Bulletin of the Atomic Scientists*. Vol. 59, No. 3 (May/June 2003).

"First Annual Report to The President and The Congress of the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction," December 15, 1999.

Hinton, Henry L, Jr. Testimony before the House Subcommittee on National Security, Veteran Affairs, and International Relations, House Committee on Government Reform, House of Representatives. March 11, 1999.

Hoffman, Bruce. *"Holy Terror": The Implications of Terrorism Motivated by a Religious Imperative*. Santa Monica: RAND, 1993.

Hoffman, Bruce. "Terrorist Targeting: Tactics, Trends, and Potentialities." *Terrorism and Political Violence* Vol. 5, No. 2 (Summer 1993).

Hoffman, Bruce. "Terrorism and WMD: Some Preliminary Hypotheses." *The Nonproliferation Review* Vol. 4. No.3 (Spring-Summer 1997).

Hoffman, Bruce. *Inside Terrorism*. New York: Columbia Univ. Press, 1998.

Hoffman, Bruce. "Combating Terrorism: In Search of a National Strategy." Testimony before the House Subcommittee on National Security, Veteran Affairs, and International Relations, House Committee on Government Reform, House of Representatives. March 27, 2001.

Hoffman, Bruce. "Change and Continuity in Terrorism." *Studies in Conflict and Terrorism* Vol. 24, No. 5 (September 2001).

Hoffman, Bruce. "Terrorism and Counterterrorism After September 11th." U.S. Department of State, International Information Programs. (November 2001).

Howard, Russell D. and Reid L. Sawyer, Ed. *Terrorism and Counterterrorism: Understanding the New Security Environment*. Guilford, CT: McGraw-Hill, 2004.

"IAEA on Threat of Nuclear Terrorism." IAEA Press Release, United Nations International Atomic Energy Agency. November 1, 2001.

"Inadequate Control of World's Radioactive Sources." IAEA Press Release, United Nations International Atomic Energy Agency. September 2002.

Jackson, Brian A. "Technology Acquisition By Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption." *Studies in Conflict and Terrorism* Vol. 24, No. 3 (2001).

Jacobs, Stanley S. "The Nuclear Threat as a Terrorist Option." *Terrorism and Political Violence* Vol. 10, No. 4 (Winter 1998).

Jenkins, Brian. "Defense Against Terrorism." *Political Science Quarterly* Vol.101, No.5 (1986).

Jenkins, Philip. *Images of Terror: What We Can and Can't Know about Terrorism*. Hawthorne, NY: Aldine de Gruyter, 2003.

Jongman Albert J, and Alex P. Schmid. *Political Terrorism: A New Guide to Actors, Authors, Concepts, Data Bases, Theories and Literature*. Amsterdam: North-Holland, 1988.

Juergensmeyer, Mark. "The Worldwide Rise of Religious Nationalism." *Journal of International Affairs* Vol. 50, No. 1 (Summer 1996).

Juergensmeyer, Mark. *Terror in the Mind of God: The Global Rise of Religious Violence*. Berkeley: University of California, 2003.

Kaplan, David E. and Andrew Marshall. *The cult at the end of the world: The terrifying story of the Aum doomsday cult, from the subways of Tokyo to the nuclear arsenals of Russia*. New York: Crown Publishers, 1996.

Kaufman, Robert. *Inside Scientology: How I Joined Scientology and Became Superhuman*. New York: Olympia, 1972.

Kelle, Alexander and Annette Schaper, "Terrorism using Nuclear and Biological Weapons: A Critical Analysis of Risks after 11 September 2001." Peace Research Institute Frankfurt (PRIF), PRIF Reports No. 64 (2003).

Kelly, Henry. Testimony before the Senate Foreign Relations Committee. March 6, 2002

Kepel, Gilles. *The Revenge of God: The Resurgence of Islam, Christianity and Judaism in the Modern World*. University Park: Pennsylvania State University, 1994.

Lalich, Janja. *Bounded Choice: True Believers and Charismatic Cults*. Berkeley: University of California, 2004.

Lamchichi, Abderrahim. *L'islamisme politique*. Paris: Harmattan, 2001.

Laqueur, Walter, Ed. *Fascism: A Reader's Guide. Analyses, Interpretations, Bibliography*. Berkeley: University of California, 1976.

Laqueur, Walter. *The New Terrorism: Fanaticism and the Arms of Mass Destruction*. New York: Oxford University Press, 1999.

Leitenberg, Milton. "Aum Shinrikyo's Efforts to Produce Biological Weapons: A Case Study in the Serial Propagation of Misinformation." *Terrorism and Political Violence* Vol. 11, No. 4 (Winter 1999).

Leitenberg, Milton. "An Assessment of the Biological Weapons Threat to the United States," White Paper prepared for the Conference on Emerging Threats Assessment: Biological Terrorism at the Institute for Security Technology Studies, Dartmouth College, July 7-9, 2000.

Leitenberg, Milton, "Biological Weapons and "Bioterrorism" in the First Years of the 21st Century," Paper Prepared for the Conference on "The Possible Use of Biological Weapons by Terrorist Groups: Scientific, Legal and International Implications." (April 16, 2002).

Lewis, Bernard. "License to Kill; Usama bin Ladin's Declaration of Jihad." *Foreign Affairs* Vol. 77, No. 6 (November/December 1998).

Lewis, James L. *Scientology: Religious Consciousness in a Technological Age*. New York: Garland, 1991.

Loeb, Cheryl and Peter D. Zimmerman. "Dirty Bombs: The Threat Revisited." *Defense Horizons* No. 38 (January 2004).

Maerli, Morten Bremer. "Relearning the ABCs: Terrorists and 'Weapons of Mass Destruction.'" *Nonproliferation Review* Vol. 7, No. 2 (Summer 2000).

Marlo, Francis H. "WMD Terrorism and US Intelligence Collection." *Terrorism and Political Violence* Vol. 11, No. 3 (Autumn 1999).

Mayer, Jean-François. "Cults, Violence and Religious Terrorism: An International Perspective." *Studies in Conflict and Terrorism* Vol. 24, No. 5 (September 2001).

McCloud, Kimberly and Matthew Osborne. "WMD Terrorism and Usama Bin Laden." *CNS Reports*, The Center for Nonproliferation Studies. (November 20, 2001).

McCormick, Gordon, H. "Terrorist Decision Making." *Annual Reviews in Political Science* Vol. 6 (2003).

Melton, J. Gordon. *The Church of Scientology*. Salt Lake City: Signature/CESNUR, 2000.

Miller, Russell. *Bare-Faced Messiah: The True Story of L. Ron Hubbard*. New York: Henry Holt, 1988.

Nacos, Brigitte L. *Mass-Mediated Terrorism: The Central Role of the Media in Terrorism and Counterterrorism*. Lanham, MD: Rowman & Littlefield, 2002.

Nacos, Brigitte L. "The Terrorist Calculus behind 9-11: A Model for Future Terrorism." *Studies in Conflict and Terrorism* Vol. 26, No. 1 (2003).

Noble, Kerry. *Tabernacle of Hate: Why They Bombed Oklahoma City*. Prescott, Ontario: Voyageur, 1998.

O'Neill, Kevin. "The Nuclear Terrorism Threat." Institute for Science and International Security (August 1997).

Palfy, Arpad. "Weapons System Selection and Mass-Casualty Outcomes." *Terrorism and Political Violence* Vol. 15, No.2 (Summer 2003).

Palmer, Susan J. *Aliens Adored: Rael's UFO Religion*. New Brunswick: Rutgers University, 2004.

Parachini, John V. "Combating Terrorism: Assessing the Threat," Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of Representatives. October 20, 1999.

Parachini, John V. "Combating Terrorism: Assessing the Threat, Risk Management, and Establishing Priorities," Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of Representatives. July 26, 2000.

Parachini, John V. "Comparing Motives and Outcomes of Mass Casualty Terrorism Involving Conventional and Unconventional Weapons." *Studies in Conflict and Terrorism* Vol. 24, No. 5 (September 2001).

Parachini, John V. "Non-Proliferation Policy and the War in Terrorism." *Arms Control Today* Vol. 31, No. 8 (October 2001).

Parachini, John V. "Putting WMD Terrorism into Perspective" *Washington Quarterly* Vol. 26, No. 4 (Autumn 2003).

Parrish, Scott. "Are Suitcase Nukes on the Loose? The Story Behind the Controversy." *CNS Reports*, The Center for Nonproliferation Studies (November 1997).

Partridge, Christopher, Ed. *UFO Religions*. London and New York: Routledge, 2003.

Pate, Jason. "Anthrax and Mass-Casualty Terrorism: What is the Bioterrorist Threat after September 11th?" U.S. Department of State, International Information Programs. (November 2001).

Pate, Jason and Laura Snyder. "Tracking Anthrax Hoaxes and Attacks," *Research Story of the Week*, The Center for Nonproliferation Studies. (May 20, 2002).

Perry, William J. "Preparing for the Next Attack" *Foreign Affairs* Vol. 80, No. 6 (November/December 2001).

Pilch, Richard F. "Smallpox: Threat, Vaccine, and US Policy," The Center for Nonproliferation Studies.

Pilch, Richard F. and Raymond Zilinskas, Eds. *Encyclopedia of Bioterrorism Defense*. New York: Wiley, 2004. Forthcoming.

Pillar, Paul R. *Terrorism and U.S. Foreign Policy*. Washington, DC: Brookings Institution, 2001.

Post, Jerrold M. and Keven G. Ruby, and Eric D. Shaw, "The Radical Group in Context: An Integrated Framework for the Analysis of Group Risk for Terrorism" *Studies in Conflict and Terrorism* Vol. 25, No. 2 (2002).

Powers, Michael J. "Deterring Terrorism with CBRN Weapons: Developing a Conceptual Framework." *CBACI Occasional Paper 2* (February 2001).

Quillen, Chris. "A Historical Analysis of Mass Casualty Bombers" *Studies in Conflict and Terrorism* Vol. 25, No. 5 (September-October 2002).

Ranstorp, Magnus. "Terrorism in the Name of Religion." *Journal of International Affairs* Vol. 50, No. 1 (Summer 1996).

Rapoport, David. "Fear and Trembling: Terrorism in Three Religious Traditions." *American Political Science Review* Vol. 78, No. 3 (September 1984).

Rapoport, David. "Terrorism and Weapons of the Apocalypse." *National Security Studies Quarterly* Vol. 5, No. 3 (Summer 1999).

Reader, Ian. *Religious Violence in Contemporary Japan: The Case of Aum Shinrikyo*. Honolulu: University of Hawaii, 2000.

Reader, Ian. "Scholarship, Aum Shinrikyo, and Academic Integrity." *Nova Religio* Vol. 3, No. 2 (April 2000).

Reich, Walter, Ed. *Origins of Terrorism: Psychologies, Ideologies, Theologies, States of Mind*. Cambridge and New York: Woodrow Wilson International Center for Scholars and Cambridge University Press, 1990.

Roberts, Brad, Ed. *Terrorism with Chemical and Biological Weapons: Calibrating Risks and Responses*. Alexandria, VA: Chemical and Biological Arms Control Institute, 1997.

Roberts, Brad, Ed. *Hype or Reality? The "New Terrorism" and Mass Casualty Attacks*. Alexandria, VA: The Chemical and Biological Arms Control Institute, 2000.

Ronfeldt, David F. and William Sater. *The Mindsets of High-Technology Terrorists: Future Implications from an Historical Analog*. Santa Monica: RAND, 1981.

Rosenau, William. "Aum Shinrikyo's Biological Weapons Program: Why Did it Fail?" *Studies in Conflict and Terrorism* Vol. 24, No. 4 (July 2001).

Ronson, Jon. *Them: Adventures with Extremists*. New York: Simon & Schuster, 2002.

"Roundtable on the Implications of the September 11, 2001, Terrorist Attacks for Nonproliferation and Arms Control." *The Nonproliferation Review* Vol. 8, No. 3 (Fall-Winter 2001).

Sands, Amy and Jonathan B. Tucker. "An Unlikely Threat," *Bulletin of the Atomic Scientists* Vol. 55, No. 4 (July/August 1999).

Sands, Amy. "Deconstructing the Chem-Bio Threat," Testimony before the Senate Foreign Relations Committee. March 19, 2002.

Annette Schaper, "Nuclear Terrorism: Risk Analysis after 11 September 2001," *Disarmament Forum: Nuclear Terrorism*. No. 2 (2003).

Schmid, Alex P. "Terrorism and The Use of Weapons of Mass Destruction: From Where The Risk?" *Terrorism and Political Violence*, Vol. 11, No. 4 (Winter 1999).

Schmid, Alex P. "Chemical Terrorism: Precedents and Prospects" *Synthesis* (Summer/June 2001). www.opcw.org/synthesis/html/s6/p9prt.html.

"Scientology's Secret Service: Inside Scientology's Intelligence Agencies." Available at <http://www.xs4all.nl/~kspaink/cos/SecrServ/go.htm>.

Siegrist, David W. "The Threat of Biological Attack: Why Concern Now?" *Emerging Infectious Diseases* Vol. 5, No. 4 (July-August 1999).

Sivan, Emmanuel. *Radical Islam: Medieval Theology and Modern Politics*. New Haven: Yale University, 1990.

Sokov, Nikolai. "Suitcase Nukes: Permanently Lost Luggage." *CNS Research Story*, The Center for Nonproliferation Studies. February 13, 2004.

Sprinzak, Ehud. "The Great Superterrorism Scare." *Foreign Policy* Vol. 112 (Fall 1998).

Spector, Leonard. Testimony before the Senate Subcommittee on International Security, Nonproliferation, and Federal Services, Senate Committee on Governmental Affairs. November 14, 2001.

Stein, Alexandra. *Inside Out: A Memoir of Entering and Breaking Out of a Minneapolis Political Cult*. St. Cloud, MN: North Star, 2002.

Stern, Jessica. *The Ultimate Terrorists*. Cambridge, MA : Harvard University, 1999.

"Suitcase Nukes: A Reassessment," *Research Story of the Week* The Center for Nonproliferation Studies. September 23, 2002.

Thomas, Dominique. *Le Londonistan: La voix du djihad*. Paris: Michalon, 2003.

Tourish, Dennis and Tim Wohlforth. *On the Edge: Political Cults Right and Left*. Armonk, NY: M. E. Sharpe, 2000.

Trento, Joe. "Assuming al-Qaeda [sic] is a Nuclear Power." Public Education Center, March 2, 2004. www.publicedcenter.org/stories/trento/2004-03-02.

Tucker, Jonathan B. "Historical Trends Related to Bioterrorism: An Empirical Analysis" Vol. 5, No. 4 (July-August 1999).

Tucker, Jonathan B, Ed. *Toxic Terror: Assessing Terrorist use of Chemical and Biological Weapons*. Cambridge, Mass.: MIT, 2000.

Tucker, Jonathan B. "Improving Infectious Disease Surveillance to Combat Bioterrorism and Natural Emerging Infections," Testimony before the Senate Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education, and Related Agencies. October 3, 2001.

Tucker, Jonathan B. "The Proliferation of Chemical and Biological Weapons Materials and Technologies to State and Sub-State Actors," Testimony before the Senate Subcommittee on International Security, Nonproliferation, and Federal Services, Senate Committee on Governmental Affairs. November 7, 2001

Vegar, Jose "Terrorism's New Breed." *Bulletin of the Atomic Scientists* Vol. 54, No. 2 (March/April 1998).

Wallis, Roy. *The Road to Total Freedom: A Sociological Analysis of Scientology*. New York: Columbia University, 1977.

Watanabe, Manabu. "Religion and Violence in Japan Today: A Chronological and Doctrinal Analysis of Aum Shinrikyo." *Terrorism and Political Violence* Vol. 10, No. 4 (Winter 1998).

Weber, Eugen. *Varieties of Fascism: Doctrines of Revolution in the Twentieth Century*. Princeton, NJ: Van Nostrand, 1964.

White, Robert W. "Issues in the Study of Political Violence: Understanding the Motives of Participants in Small Group Political Violence." *Terrorism and Political Violence* Vol.12, No.1 (Spring 2000).

Zablocki, Benjamin and Thomas Robbins, Eds. *Misunderstanding Cults; Searching for Objectivity in a Controversial Field*. Toronto: University of Toronto, 2001.

Zanders, Jean Pascal. "Assessing the Risk of Chemical and Biological Weapons Proliferation to Terrorists" *The Nonproliferation Review* Vol. 6, No. 4 (Fall 1999).

Zilinskas, Raymond A. "Assessing the Threat of Bio-Terrorism," Testimony before the House Subcommittee on National Security, Veterans Affairs, and International Relations, House Committee on Government Reform, House of Representatives. October 20, 1999.

Zilinskas, Raymond A, Rapporteur. "Bioterrorism Threat Assessment and Risk Management Workshop." The Center for Nonproliferation Studies. (June 24, 2003).