

# THE ATOMIC TERRORIST: ASSESSING THE LIKELIHOOD

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**ABSTRACT:** A terrorist atomic bomb is commonly held to be the single most serious threat to the national security of the United States. Assessed in appropriate context, that could actually be seen to be a rather cheering conclusion because the likelihood that a terrorist group will come up with an atomic bomb seems to be vanishingly small. Moreover, the degree to which al-Qaeda--the chief demon group and one of the few terrorist groups to see value in striking the United States--has sought, or is capable of, obtaining such a weapon seems to have been substantially exaggerated.

When asked by Jim Lehrer in their first presidential debate in September 2004 to designate the "single most serious threat to the national security to the United States," the candidates had no difficulty agreeing on one. Concluded Lehrer, "So it's correct to say the single most serious threat you believe, both of you believe, is nuclear proliferation?" George W. Bush: "In the hands of a terrorist enemy." John Kerry: "Weapons of mass destruction, nuclear proliferation."<sup>1</sup>

In like manner, Governor Thomas Kean, chair of the 9/11 Commission, confesses that what keeps him up at night is "the worry of a terrorist with a nuclear device in one of our major cities."<sup>2</sup> FBI Director Robert Mueller also reportedly wakes up in the middle of the night worrying about an al Qaeda nuclear strike (Kessler 2007, 221), and Bill Keller of the New York Times has complained about a similar disorder: after finishing a long article about nuclear terrorism for that newspaper's magazine, he remained boldly determined not to evacuate Manhattan, but, he admitted, "neither am I sleeping quite as soundly." Keller also reports the response of then-Secretary of Homeland Security Tom Ridge when asked what he worried about most: Ridge "cupped his hands prayerfully and pressed his fingertips to his lips. 'Nuclear,' he said simply" (2002). Many academics are distinctly inclined to agree. Chief among them is the distinguished political scientist, Graham Allison, in his thoughtful, well-argued, and determinedly alarming 2004 book, Nuclear Terrorism: The Ultimate Preventable Catastrophe.

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<sup>1</sup> Also: "Nuclear proliferation.....There's some 600-plus tons of unsecured material still in the former Soviet Union and Russia....there are terrorists trying to get their hands on that stuff today" (Kerry); "I agree with my opponent that the biggest threat facing this country is weapons of mass destruction in the hands of a terrorist network" (Bush).

<sup>2</sup> As interviewed for Frontline's "The Enemy Within," PBS, on March 27, 2006:  
<http://www.pbs.org/wgbh/pages/frontline/enemywithin/interviews/kean.html>

In fact, in the eyes of many, the issue is of the highest conceivable importance. Senator Richard Lugar contends that terrorists armed with atomic weapons (or even of lesser "weapons of mass destruction") present an "existential" threat to the United States (Fox News Sunday, June 23, 2003), or even, in columnist Charles Krauthammer's view, to "civilization itself" (2004a). Allison asserts that atomic terrorists could "destroy civilization as we know it" (2004, 191), and Joshua Goldstein is convinced they could "destroy our society" (2004, 179). Two counterterrorism officials from the Clinton administration contend that a small atomic detonation "would necessitate the suspension of civil liberties," would halt or even reverse globalization, "could be the defeat that precipitates America's decline," and would "trigger an existential crisis for the United States and its allies." (Benjamin and Simon 2002, 398-99, 418). When he was chairman of the Joint Chiefs of Staff, General Richard Myers meticulously calculated that if terrorists were able to kill 10,000 Americans in an attack, something quite possible with an atomic bomb, they would "do away with our way of life" (Kerr 2003). Not to be outdone, Matthew Bunn and Anthony Wier contend that the "world's security" is at stake (2006, 146), while Michael Ignatieff warns that atomic terrorists threaten "the ascendancy of the modern state" and that "inexorably, terrorism, like war itself, is moving beyond the conventional to the apocalyptic" (2004b, 146).

The events of September 11, 2001, have, of course, greatly (if irrelevantly) elevated concerns about atomic terrorism. "Nothing is really new about these perils," notes Keller, but 9/11 turned "a theoretical possibility into a felt danger," giving "our nightmares legs" (2002).

This paper seeks to assess our "most serious" security threat and concludes that maybe Keller, Governor Kean, and Director Mueller can get some sleep. It argues that the likelihood a terrorist group will come up with an atomic bomb seems to be vanishingly small--perhaps very substantially less than one in a million. Moreover, the degree to which al-Qaeda--the only terrorist group that has explicitly threatened to strike the United States--has sought, or is capable of, obtaining such a weapon seems to have been substantially exaggerated.

### **Imagined predictions**

Quoting from Governor Kean's Commission report, Allison has ascribed the fact that the United States was surprised on 9/11 to a "failure of imagination" (2006, 36). After exercising his own imagination and examining the atomic terrorism issue, he proclaims his "considered judgment" in his book: "on the current path, a nuclear terrorist attack on America in the decade ahead is more likely than not" (2004, 15). He repeats that judgment in an article published two years later without reducing the terminal interval to compensate--apparently the end date is an ever-receding target (2006, 39).<sup>3</sup> Actually, he had been in the prediction business on this issue at least as early as 1995 when his imagination induced him boldly to pronounce, "In the absence of a determined program of action, we have every reason to anticipate acts of nuclear terrorism against American targets before this decade is out."

If there was a failure to exercise imaginations before the 9/11 attacks, this defect was

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<sup>3</sup> In support of his prediction Allison cites the "world's most successful investor" and "legendary odds maker," Warren Buffett, as declaring a nuclear terrorist attack to be inevitable (2004, 14-15; 2006, 39). Contacted by the Wall Street Journal, however, Buffett says he was worrying about any nuclear explosion, not just one set off by terrorists, and that he was talking about something that might come about over the next century, not within a ten-year period (Bialik 2005), something that seems clear in the source Allison uses for his quote: Serwer and Boorstin 2002. George Will, working from the musings of Gregg Easterbrook, has wryly advised doomsayers to predict catastrophe no later than ten years into the future but no sooner than five because that would be soon enough to terrify their rapt listeners, but far enough off for people to forget if the doomsaying proves to be wrong (2004).

substantially reversed in the aftermath. Notes Allison, "no one" in the American national security community considered that disaster to be an "isolated occurrence" (2004, 6), and it was apparently inconceivable that the country would go over six years (and counting) without a some sort of repetition. Or even three: it was in 2004 that Charles Krauthammer characterized the post-9/11 period as one in which, "contrary to every expectation and prediction" (and, one might add, fantasy) the second shoe never dropped (2004a). As Rudy Giuliani, New York's mayor on 9/11, reflected in 2005, "Anybody--any one of these security experts, including myself--would have told you on September 11, 2001, we're looking at dozens and dozens and multiyears of attacks like this. It hasn't been quite that bad" (CNN, 22 July 2005).<sup>4</sup> No, not nearly. Precisely what Giuliani's "security experts" were basing their expert opinion on is not entirely clear, but there certainly was no failure--or at any rate, lack--of imagination.

There have been plenty of imaginative predictors on other issues as well. World War III is always, and will always remain, possible. However, a prediction in the aftermath of World War II that the planet would go 60 years and more without a repetition of that experience would have been met with derision by the thoughtful alarmists of the time like the imaginative historian Arnold Toynbee: "In our recent Western history war has been following war in an ascending order of intensity; and today it is already apparent that the War of 1939-45 was not the climax of this crescendo movement" (1950, 4). Or by the imaginative futurist H. G. Wells: "the end of everything we call life is close at hand and cannot be evaded" (Wagar 1961, 13n). Or by the imaginative dictator Josef Stalin: "We shall recover in fifteen or twenty years and then we'll have another go at it" (Djilas 1962, 114-15). Or by the imaginative scientist Albert Einstein: "Unless we are able, in the near future, to abolish the mutual fear of military aggression, we are doomed" (1960, 533). Or by the imaginative publishers of Bulletin of the Atomic Scientists who have sported a "doomsday clock" on the cover that has pointedly--and, some might irreverently suggest, pointlessly--remained frozen at a few minutes before midnight for the better part of a century now (see also Mueller 1989, 97-99).

Allison's bold, imaginative, and alarming prediction of 2004 may, unlike the one he issued in 1995, prove right. But it also might end up there with that of the imaginative scientist/novelist who assured us nearly 50 years ago that if "the nuclear arms race between the United States and the U.S.S.R. not only continues but accelerates...within, at the most, ten years, some of those bombs are going off" (Snow 1961, 259); or with that of the imaginative political scientist who in 1979 proclaimed, "The world is moving ineluctably towards a third world war--a strategic nuclear war" (Hans J. Morgenthau in Boyle 1985, 73); or with that of the imaginative pundit who confidently assured us in May 2004 that "we can confidently expect that terrorists will attempt to tamper with our election in November" (Ignatieff 2004a, 48).

As this experience suggests, it is clearly possible to have a surfeit of imagination and to become obsessed with what Bernard Brodie once labeled in somewhat different context, "worst case fantasies" (1978, 68). Peter Zimmerman and Jeffrey Lewis pointedly conclude a 2006 article by declaring, "just because a nuclear terrorist attack hasn't happened shouldn't give us the false comfort of thinking it won't" (2006, 39). However, just because something terrible is possible shouldn't send us into hysterics thinking it will surely come about.

If there has been a "failure of imagination," perhaps it has been in the inability or unwillingness to consider the difficulties confronting the atomic terrorist. Terrorist groups seem to have exhibited only

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<sup>4</sup> See also Benjamin and Simon 2005, 115. For an early suggestion that 9/11 might fail to inspire a sequel of that magnitude, see Mueller 2002a, 2002b. Krauthammer apparently missed these items although they appeared in publications he regularly writes for. See also Mueller 2003; Seitz 2004.

limited desire and even less progress in going atomic. This may be because, after brief exploration, they have discovered that the tremendous effort required is scarcely likely to be successful.

### **The atomic terrorist: likelihood**

Warnings about the possibility that small groups could fabricate nuclear weapons have been repeatedly uttered at least since 1946 when A-bomb maker J. Robert Oppenheimer agreed that "three or four men" could smuggle atomic bomb units into New York and "blow up the whole city" (Allison 2004, 104), a massive and absurd exaggeration of the capacity of atomic bombs of the time. Such assertions proliferated after the 1950s when the "suitcase bomb" appeared to become a practical possibility. And it has now been over three decades since terrorism specialist Brian Jenkins published his warnings about how the "widespread distribution of increasingly sophisticated and increasingly powerful man-portable weapons will greatly add to the terrorist's arsenal" and about how "the world's increasing dependence on nuclear power may provide terrorists with weapons of mass destruction" (1975, 33). Or since John McPhee ominously reported that "to many people who have participated in the advancement of the nuclear age, it seem not just possible but more and more apparent that nuclear explosions will again take place in cities" (1974, 3). We continue to wait.

It is essential to note, however, that making a bomb is an extraordinarily difficult task. Thus, a set of counterterrorism and nuclear experts interviewed in 2004 by Dafna Linzer for the Washington Post pointed to the "enormous technical and logistical obstacles confronting would-be nuclear terrorists, and to the fact that neither al-Qaeda nor any other group has come close to demonstrating the means to overcome them." Allison nonetheless opines that a dedicated terrorist group, al-Qaeda in particular, could get around all the problems in time and eventually steal, produce, or procure a "crude" bomb or device, one that he however acknowledges would be "large, cumbersome, unsafe, unreliable, unpredictable, and inefficient" (2004, 97; see also Bunn and Wier 2006, 139; Pluta and Zimmerman 2006, 61).

In his recent book, Atomic Bazaar: The Rise of the Nuclear Poor, William Langewiesche spends a great deal of time and effort assessing the process by means of which a terrorist group could come up with a bomb. Unlike Allison, he concludes that it "remains *very, very* unlikely. It's a possibility, but unlikely." Also:

The best information is that no one has gotten anywhere near this. I mean, if you look carefully and practically at this process, you see that it is an enormous undertaking full of risks for the would-be terrorists. And so far there is no public case, at least known, of any appreciable amount of weapons-grade HEU [highly enriched uranium] disappearing. And that's the first step. If you don't have that, you don't have anything.

As it happens, the first of these bold declarations comes from a book discussion telecast in June 2007 on C-SPAN and the second from an interview on National Public Radio.<sup>5</sup> Judgments in the book itself, while consistent with such conclusions, are expressed more ambiguously, even coyly: "at the extreme is the possibility, entirely real, that one or two nuclear weapons will pass into the hands of the new stateless guerrillas" (2007, 17) or "if a would-be nuclear terrorist calculated the odds, he would have to admit that they are stacked against him," but they are "not impossible" (2007, 69)

Even more, blurb writers have concluded (needless to say) that it is hysteria, not reassurance, that sells. Thus, the jacket flap says the book "examines in dramatic and tangible detail the chances of such weapons being manufactured and deployed by terrorists," an accurate description, but one that deftly

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<sup>5</sup> The C-SPAN talk was recorded in Seattle on May 24, 2007, and telecast in June. NPR: Morning Edition, 15 May 2007.

avoids revealing the author's conclusion as to what those chances actually happen to be. And when the Atlantic (purveyor last decade of cheery cover screeds about "The Crisis of Public Order," "The Drift Toward Disaster," "The Coming Anarchy," and "The Coming Plague") published the relevant chapter from Langewiesche's book in December 2006, it chose to accentuate the negative on its wraparound grabber: "The Nuclear Nightmare: How a Terrorist Could [not even the slightly more circumspect "Might"] Get a Bomb," and the article itself was provocatively and misleadingly entitled, "How to Get a Nuclear Bomb." Many alarmists have taken that to be the Langewiesche's message.

If the prospects that terrorists might come up with a bomb are "not impossible," how close to impossible are they? Langewiesche's discussion, as well as other material, helps us assess the many ways such a quest--in his words, "an enormous undertaking full of risks"--could fail. The odds, indeed, are stacked against the terrorists, perhaps massively so.

### **Assistance by a state**

A favorite fantasy of imaginative alarmists envisions that a newly nuclear country will palm off a bomb or two to friendly terrorists for delivery abroad. As Langewiesche stresses, however, this is highly improbable because there would be too much risk, even for a country led by extremists, that the ultimate source of the weapon would be discovered (2007, 20; also Kamp 1996, 33; Bunn 2006, 115; Bunn and Wier 2006, 137).<sup>6</sup> Moreover, there is a very considerable danger the bomb and its donor would be discovered even before delivery or that it would be exploded in a manner and on a target the donor would not approve (including on the donor itself).

It is also worth noting that, although nuclear weapons have been around now for well over half a century, no state has ever given another state--even a close ally, much less a terrorist group--a nuclear weapon (or chemical, biological, or radiological one either, for that matter) that the recipient could use independently. For example, during the Cold War, North Korea tried to acquire nuclear weapons from its close ally, China, and was firmly refused (Oberdorfer 2005; see also Pillar 2003, xxi). There could be some danger from private (or semi-private) profiteers, like the network established by Pakistani scientist A. Q. Khan. However, its activities were rather easily penetrated by intelligence agencies (the CIA, it is very likely, had agents within the network), and the operation was abruptly closed down when it seemed to be the right time (Langewiesche 2007, 169-72).

In addition, al-Qaeda--the chief demon group and one of the few terrorist groups to see value in striking the United States--is unlikely to be trusted by just about anyone.<sup>7</sup> As Peter Bergen (2007, 19) has pointed out, the terrorist group's explicit enemies list includes not only Christians and Jews, but all

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<sup>6</sup> An indication of this sensitivity can be found in the experience of the Pakistani journalist, Hamid Mir. In an interview conducted as al-Qaeda's position in Afghanistan was about to be overrun, Osama bin Laden contended to Mir that al-Qaeda possessed chemical and nuclear weapons (this episode is assessed more fully below). According to Mir, the Pakistani government told him "not to mention the nuclear weapon under any circumstance because the Americans might think Pakistan had sold it" to bin Laden. The result was, says Mir, that when the interview was published in Urdu in Ausaf, the sentence was censored. When it later appeared in the English-language newspaper Dawn, however, it was not. [www.maldivesculture.com/maldives\\_osama\\_bin\\_laden.html](http://www.maldivesculture.com/maldives_osama_bin_laden.html). For the variant texts, see Lawrence 2005, 142. Although the Pakistanis appear to have gotten the message on their own, it was presumably hammered home a bit later in that year when CIA Director George Tenet flew to the country in part to tell Pakistan's president, "You cannot imagine the outrage there would be in my country if it were learned that Pakistan is coddling scientists who are helping Bin Ladin acquire a nuclear weapon. Should such a device ever be used, the full fury of the American people would be focused on whoever helped al-Qa'ida in its cause" (Tenet and Harlow 2007, 266).

<sup>7</sup> On the divisive issue among jihadists of striking the "far enemy," see Gerges 2005.

Middle Eastern regimes; Muslims who don't share its views; most Western countries; the governments of India, Pakistan, Afghanistan, and Russia; most news organizations; the United Nations; and international NGOs. Most of the time it didn't get along all that well even with its host in Afghanistan, the Taliban government (Burke 2003, 150, 164-65; Wright 2006, 230-1, 287-88; Cullison 2004).

### **Stealing or buying a bomb: loose nukes**

There has been a lot of worry about "loose nukes," particularly in post-Communist Russia--weapons, "suitcase bombs" in particular, that can be stolen or bought illicitly. However, when asked, Russian nuclear officials and experts on the Russian nuclear programs "adamantly deny that al Qaeda or any other terrorist group could have bought Soviet-made suitcase nukes." They further point out that the bombs, all built before 1991, are difficult to maintain and have a lifespan of one to three years after which they become "radioactive scrap metal" (Badkhen 2004). Similarly, a careful assessment of the concern conducted by the Center for Nonproliferation Studies has concluded that it is unlikely that any of these devices have actually been lost and that, regardless, their effectiveness would be very low or even non-existent because they require continual maintenance (2002, 4, 12; see also Smith and Hoffman 1997; Langewiesche 2007, 19). By 2007, even such alarmists at Anna Pluto and Peter Zimmerman were concluding that "It is probably true that there are no 'loose nukes', transportable nuclear weapons missing from their proper storage locations and available for purchase in some way (2007, 56).

It might be added that Russia has an intense interest in controlling any weapons on its territory since it is likely to be a prime target of any illicit use by terrorist groups, particularly, of course, Chechen ones with whom it has been waging an vicious on-and-off war for over a decade (Cameron 2004, 84). Officials there insist that all weapons have either been destroyed or are secured, and the experts polled by Linzer (2004) point out that "it would be very difficult for terrorists to figure out on their own how to work a Russian or Pakistan bomb" even if they did obtain one because even the simplest of these "has some security features that would have to be defeated before it could be used" (see also Kamp 1996, 34; Wirz and Egger 2005, 502; Langewiesche 2007, 19). One of the experts, Charles Ferguson, stresses

You'd have to run it through a specific sequence of events, including changes in temperature, pressure and environmental conditions before the weapon would allow itself to be armed, for the fuses to fall into place and then for it to allow itself to be fired. You don't get off the shelf, enter a code and have it go off.

Moreover, continues Linzer, most bombs that could conceivably be stolen use plutonium which emits a great deal of radiation that could relatively easily be detected by passive sensors at ports and other points of transmission.

The government of Pakistan, which has been repeatedly threatened by al-Qaeda, has a similar very strong interest in controlling its nuclear weapons and material--and scientists. Notes Stephen Younger, former head of nuclear weapons research and development at Los Alamos and director of the Defense Department's Defense Threat Reduction Agency from 2001 to 2004, "regardless of what is reported in the news, all nuclear nations take the security of their weapons very seriously" (2007, 93; see also Kamp 1996, 22; Milhollin 2002, 47-48).

It is conceivable that stolen bombs, even if no longer viable as weapons, would be useful for the fissile material that could be harvested from them. However, Christoph Wirz and Emmanuel Egger, two senior physicists in charge of nuclear issues at Switzerland's Spiez Laboratory, point out that even if a weapon is not completely destroyed when it is opened, its fissile material yield would not be adequate for a primitive design, and therefore several weapons would have to be stolen and then opened successfully (2005, 502). Moreover, those weapons use (or used) plutonium, a substance that is not only problematic

to transport, but far more difficult and dangerous to work with than is highly enriched uranium.

### **Building a bomb of one's own**

Since they are unlikely to be able to buy or steal a useable bomb and since they are further unlikely to have one handed off to them by an established nuclear state, terrorists would need to manufacture the device themselves.

Because of the dangers and difficulties of transporting and working with plutonium, a dedicated terrorist group, it is generally agreed, would choose to try to use highly enriched uranium (Kamp 1996, 33; Keller 2002; Milhollin 2002, 46-47; Rees 2003, 44-45; Linzer 2004; Allison 2004, 96-97; Goldstein 2004, 131-32; Cameron 2004, 84; Wirz and Egger 2005, 500; Bunn and Wier 2006, 135; Langewiesche 2007, 21-23).<sup>8</sup> The goal would be to get as much of this stuff as necessary (more than 100 pounds is required to reach critical mass) and then fashion it into an explosive.<sup>9</sup> Most likely this would not be a bomb that can be dropped or hurled, but rather an "improvised nuclear device" (IND) that would be set off at the target by a suicidal detonation crew.

The process is a daunting one, and it requires that a whole cascade of events click perfectly and in sequence. This is a key issue. Those, like Allison, who warn about the likelihood of a terrorist bomb, argue that a terrorist group could, if often with great difficulty, surmount each obstacle--that doing so in each case is "not impossible." But it is vital to point out that while it may be "not impossible" to surmount each individual step, the likelihood that a group could surmount a series of them rather quickly does approach impossibility. Let us assess the problem.

**Procuring fissile material.** To begin with, stateless groups are simply incapable of manufacturing the required fissile material for a bomb since the process requires an enormous effort on an industrial scale (Milhollin 2002, 45-46; Allison 2004; Cameron 2004, 83; Bunn and Wier 2006, 136-37; Bunn and Wier 2006, 136-37; Langewiesche 2007, 20; Perry et al. 2007). Moreover, they are unlikely to be supplied with the material by a state for the same reasons a state is unlikely to give them a workable bomb. Thus, they would need to steal or illicitly purchase this crucial material.

Although there is legitimate concern that some material, particularly in Russia, may be somewhat inadequately secured (though things have improved considerably), it is under lock and key, and even sleepy, drunken guards, notes Langewiesche, will react with hostility (and noise) to a raiding party. Thieves also need to know exactly what they want and where it is, and this presumably means trusting bribed, but not necessarily dependable, insiders. And to even begin to pull off such a heist, they need to develop a highly nuanced "sense for streets" in foreign lands filled with people who are often congenitally suspicious of strangers (2007, 33-48).

Corruption in some areas may provide an opportunity to buy the relevant material, but purchasers of illicit goods and services would have to pay off a host of greedy confederates, any one of whom could turn on them or, either out of guile or incompetence, furnish them with stuff that is useless.

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<sup>8</sup> By contrast, Frank Barnaby tends to conclude that terrorists would work with plutonium--though this might result in a bomb much smaller than the one dropped on Nagasaki--because HEU is easily secured while plutonium is more generally available (2004, 110-17). However, as Langewiesche and others stress, working with, and transporting, plutonium is far more complicated and dangerous.

<sup>9</sup> Actually, some scientists maintain that the amount of fissile material required would be larger--"certainly several, and possibly ten times the so-called formula quantities" (Mark et al. 1987, 60). "As a rule," suggests Karl-Heinz Kamp, "the more basic the design of a nuclear weapon, the more fissile material required" (1996, 33).

Not only could the exchange prove to be a scam, it could also prove to be part of a sting--or become one. Although there may be disgruntled and much underpaid scientists in places like Russia, they would have to consider the costs of detection. A. Q. Khan, the Pakistani nuclear scientist was once a national hero for his lead work on his country's atomic bomb. But when he was brought down for selling atomic secrets to other governments, he was placed under severe house arrest, allowed no outside communication or contact, including telephone, newspapers, or internet, and is reportedly in declining health (Langewiesche 2007, 75-76).<sup>10</sup> Renegade Russian scientists who happen not to be national heroes could expect a punishment that would be considerably more unpleasant. Once it is noticed that some uranium is missing, the authorities would investigate the few people who might have been able to assist the thieves, and one who seems suddenly to have become prosperous is likely to arrest their attention right from the start. There is something decidedly worse than being a disgruntled Russian scientist, and that is being a dead disgruntled Russian scientist. Thus even one initially tempted by, seduced by, or sympathetic to, the blandishments of the sneaky foreign terrorists might well quickly develop second thoughts and go to the authorities.

It is also relevant to note that in the last ten years or so, there have been 10 known thefts of highly enriched uranium--in total less than 16 pounds or so, far less than required for an atomic explosion. Most arrestingly, notes Linzer, "the thieves--none of whom was connected to al Qaeda--had no buyers lined up, and nearly all were caught while trying to peddle their acquisitions" (Linzer 2004; see also Cameron 2004, 83-84; Younger 2007, 87; Pluta and Zimmerman 2006, 60). Though, of course, there may have been additional thefts that went undiscovered (Bunn and Wier 2006, 137; Tenet and Harlow 2007, 276-77).

If terrorists were somehow successful at obtaining a critical mass of relevant material, they would then have to transport it hundreds of miles out of the country over unfamiliar terrain and probably while being pursued by security forces (Langewiesche 2007, 48-50).

Crossing international borders would be facilitated by following established smuggling routes and, for a considerable fee, opium traders (for example) might provide expert, and possibly even reliable, assistance. But the routes are not as chaotic as they appear and are often under the watch of a handful of criminal and congenitally suspicious and careful regulators (Langewiesche 2007, 54-65). If they became suspicious of the commodity being smuggled, some of these might find it in their interest to disrupt passage, perhaps to collect the bounteous reward money likely to be offered by alarmed governments once the uranium theft had been discovered. Moreover, it is not at all clear that people engaged in the routine, if illegal, business of smuggling would necessarily be so debased that, even for considerable remuneration, they would willingly join a plot that might end up killing tens of thousands of innocent people.<sup>11</sup>

**Constructing an atomic device.** Once outside the country with their precious booty, terrorists would have to set up a large and well-equipped machine shop to manufacture a bomb and then populate it with a very select team of highly skilled scientists, technicians, and machinists. They would have to be assembled and retained for the task while no consequential suspicions are generated among friends, family, and police about their curious and sudden absence from normal pursuits back home. They would also have to be utterly devoted to the cause, of course. And, in addition, they would have to be willing to

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<sup>10</sup> In 2007, however, the terms of his confinement were relaxed a bit.

<sup>11</sup> On the need to use, and rely on, criminals and corrupt officials at all stages of procuring and making off with the purloined HEU, see Pluta and Zimmerman 2006, 58.



risk their lives, and certainly their careers, because after their bomb was discovered, or exploded, they would likely become the targets in an intense worldwide dragnet operation facilitated by the fact that their skills would not be common ones.<sup>12</sup> Applying jargon that emerged in the aftermath of an earlier brutal conspiracy, their names would become Mudd.

More than a decade ago Allison boldly insisted that it would be "easy" for terrorists to assemble a crude bomb if they could get enough fissile material (Allison et al. 1996, 12).<sup>13</sup> Atomic scientists, perhaps laboring under the concern, in Langewiesche's words, that "a declaration of safety can at any time be proved spectacularly wrong" (2007, 49), have been comparatively restrained in cataloguing the difficulties terrorists would face in constructing a bomb. But physicists Wirz and Egger have published a paper that does so, and it concludes that the task "could hardly be accomplished by a subnational group" (2005, 501). They point out that precise blueprints are required, not just sketches and general ideas, and that even with a good blueprint they "would most certainly be forced to redesign" (2005, 499-500). The process could take months or even a year or more (Pluta and Zimmerman 2006, 62), and in distinct contrast with Allison, they stress that the work, far from being "easy," is difficult, dangerous, and extremely exacting, and that the technical requirements "in several fields verge on the unfeasible." They conclude that "it takes much more than knowledge of the workings of nuclear weapons and access to fissile material to successfully manufacture a usable weapon" (2005, 501-2).

These problems are also emphasized in an earlier report by five Los Alamos scientists: although schematic drawings showing the principles of bomb design in a qualitative way are widely available,

the detailed design drawings and specifications that are essential before it is possible to plan the fabrication of actual parts are not available. The preparation of these drawings requires a large number of man-hours and the direct participation of individuals thoroughly informed in several quite distinct areas: the physical, chemical, and metallurgical properties of the various materials to be used, as well as the characteristics affecting their fabrication; neutronic properties; radiation effects, both nuclear and biological; technology concerning high explosives and/or chemical propellants; some hydrodynamics; electrical circuitry; and others (Mark et al. 1987, 58).<sup>14</sup>

Moreover, stresses physicist David Albright, the process would also require "good managers and organization people" (Keller 2002).

The Los Alamos scientists additionally point out that

the design and building would require a base or installation at which experiments could be carried out over many months, results could be assessed, and, as necessary, the effects of corrections or improvements could be observed in follow-on experiments. Similar considerations would apply with respect to the chemical, fabrication, and other aspects of the program (Mark et al. 1987, 64-65).

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<sup>12</sup> Steve Coll reports that few among a group of around 60 Los Alamos National Laboratory scientists were willing to set the probability of a "nuclear fission bomb attack on U.S. soil during the next several decades" (presumably by states *or* by terrorists) at less than 5 percent. But some of them did joke about the unlikelihood of a scenario requiring that "half a dozen tenured, ornery and egotistical physicists cooperate with each other on a demanding project" (2005).

<sup>13</sup> However, Bunn and Wier, who hail from Allison's own Center at Harvard, do acknowledge that "it is not easy to make a nuclear bomb" even after "essential ingredients are in hand" (2006, 134).

<sup>14</sup> Pluta and Zimmerman, however, suggest that the drawing preparation, at least, can now be aided by "modern computer-aided design software" (2006, 63).

Although they think the problems can be dealt with "provided adequate provisions have been made," they also stress that "there are a number of obvious potential hazards in any such operation, among them those arising in the handling of a high explosive; the possibility of inadvertently inducing a critical configuration of the fissile material at some stage in the procedure; and the chemical toxicity or radiological hazards inherent in the materials used. Failure to foresee *all* the needs on these points," they conclude laconically, "could bring the operation to a close" (Mark et al. 1987, 62, emphasis added; see also Pluta and Zimmerman 2006, 64). Or, as Gary Milhollin puts it, "a single mistake in design could wreck the whole project" (2002, 48).

Younger has more recently made a similar argument:

it would be wrong to assume that nuclear weapons are now easy to make...I am constantly amazed when self-declared "nuclear weapons experts," many of whom have never seen a real nuclear weapon, hold forth on how easy it is to make a functioning nuclear explosive....While it is true that one can obtain the general idea behind a rudimentary nuclear explosive from articles on the Internet, none of these sources has enough detail to enable the confident assembly of a real nuclear explosive (2007, 86, 88).<sup>15</sup>

Although he remains concerned that a terrorist group could buy or steal a nuclear device or be given one by an established nuclear country (2007, 93), Younger is quick to enumerate the difficulties the group would confront when trying to fabricate one on their own. He stresses that uranium is "exceptionally difficult to machine" while "plutonium is one of the most complex metals ever discovered, a material whose basic properties are sensitive to exactly how it is processed. Both need special machining technology that has evolved through a process of trial and error."

Others contend the crudest type of bomb would be "simple and robust" and "very simple" to detonate (Bunn and Wier 2006, 140). Younger disagrees:

Another challenge...is how to choose the right tolerances. "Just put a slug uranium into a gun barrel and shoot it into another slug of uranium" is one deception of how easy it is to make a nuclear explosive. However, if the gap between the barrel and the slug is too tight, then the slug may stick as it is accelerated down the barrel. If the gap is too big, then other more complex, issues may arise. All of these problems can be solved by experimentation, but this experimentation requires a level of technical resources that, until recently, few countries had. How do you measure the progress of an explosive detonation without destroying the equipment doing the measurement? How do you perform precision measurements on something that only lasts a fraction of a millionth of a second? (2007, 89)

All this work would have to be carried out in utter secret, of course, even while local and international security police are likely to be on the intense prowl. "In addition to all the usual intelligence methods," note the Los Alamos scientists, "the most sensitive technical detection equipment available

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<sup>15</sup> Younger is appalled at the activities of "scaremongers from our nuclear weapons laboratories," and he cites the way "one fast-talking scientist" from the Lawrence Livermore National Laboratory managed in 2004 to convince some members of Congress that North Korea might be able to launch a nuclear device capable of emitting a high-altitude electromagnetic pulse that could burn out computers and other equipment over a wide area. When he queried a man he considers to be "perhaps the most knowledgeable person in the world about such designs" (and who "was never asked to testify"), the response was: "I don't think the *United States* could do that sort of thing today. To say that the North Koreans could do it, and without doing any testing, is simply ridiculous." Nevertheless, concludes Younger acidly, "rumors are passed from one person to another, growing at every repetition, backed by flimsy or nonexistent intelligence and the reputations of those who are better at talking than doing" (2007, 91-92, emphasis in the original).

would be at their disposal," and effective airborne detectors used to prospect for uranium have been around for decades and "great improvement in such equipment have been realized since" (Mark et al. 1987, 60). As Milhollin presents the terrorists' problem, "the theft of the uranium would probably be discovered soon enough, and it might be only a short matter of time before the whole world showed up on their doorstep" (2002, 48).<sup>16</sup>

Moreover, points out Langewiesche, people in the area may observe with increasing curiosity and puzzlement the constant coming and going of technicians unlikely to be locals (2007, 65-69).<sup>17</sup> In addition, the bombmakers would not be able to test the product to be sure they were on the right track (Linzer 2004; Mark et al. 1987, 64).

The process of fabricating an IND requires, then, the effective recruitment of people who at once have great technical skills and will remain completely devoted to the cause. This is not an impossible task--some of the terrorists who tried to commit mayhem in Britain in 2007 had medical degrees--but it certainly vastly complicates the problem. In addition, corrupted co-conspirators, many of them foreign, must remain utterly reliable, no curious outsider must get wind of the project over the months or even years it takes to pull off, and international and local security services must be kept perpetually in the dark.

**Transporting and detonating the device.** The finished product could weigh a ton or more (Mark et al. 1987, 55, 60; Bunn and Wier 2006, 142). Encased in lead shielding to mask radioactive emissions, it would then have to be transported to, and smuggled into, the relevant country. This would presumably require trusting it to the tender mercies of the commercial transportation system, supplying a return address, and hoping that the employees and policing agencies, alerted to the dangers by news of the purloined uranium, would remain oblivious. Or the atomic terrorists could try to use established smuggling routes, an approach that, again, would require the completely reliable complicity of a considerable number of criminals.

The enormous package would then have to be received by a dedicated and technically-proficient group of collaborators. For this purpose, it would be necessary earlier to have infiltrated such people into the country or else to have organized locals. In a still-secret 2005 report, the FBI allowed as how it had been unable to find a single true al-Qaeda sleeper cell anywhere in the United States after years of devoted and well-funded sleuthing (Ross 2005), something that apparently continues to be true.<sup>18</sup> (In interesting synergy, that would be exactly the number of weapons of mass destruction uncovered by the U.S. military in Iraq over the same period.) They don't seem to have found any since that time, either. This does not conclusively prove either that there are no such cells in the United States or that al-Qaeda is incapable of infiltrating some in when the need arises, of course. But, while absence of evidence may not be conclusive evidence of absence, it should not be taken to be evidence of existence either.

And while it is conceivable that locals could be organized for the destructive enterprise, they

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<sup>16</sup> He also points out that Pakistan keeps exceedingly careful watch over its bomb-grade uranium (2002, 47).

<sup>17</sup> The Los Alamos scientists suggest that the process of bomb building could be speeded up if the team were able to spend "a considerable number of weeks (or, more probably, months)" preparing and practicing for the assembly using natural uranium as a stand-in (Mark et al. 1987, 59). This would still not solve the problem of curious locals, of course. Moreover, it seems to be rather impractical since, given the difficulties of securing adequate quantities of fissile material, the team might spend years, even decades, waiting around for the stuff to arrive.

<sup>18</sup> In distinct contrast, imaginative intelligence officials estimated in 2002 that there were as many as 5000 al-Qaeda terrorists and supporters in the country (Gertz 2002).

would of necessity have to be considerably higher up on brain chain than the ones so far apprehended--higher up, for example, than those who took violent jihadist videos into a store to be duplicated or who schemed to take down the Brooklyn Bridge with a blowtorch.<sup>19</sup>

The IND would then have to be moved over local and unfamiliar roads by this crew to the target site in a manner that did not arouse suspicion. And, finally, at the target site, the crew, presumably suicidal, would have to set off its improvised and untested nuclear device, one that, to repeat Allison's description, would be "large, cumbersome, unsafe, unreliable, unpredictable, and inefficient" (2004, 97). While doing this they would have to hope, and fervently pray, that the machine shop work has been perfect, that there have been no significant shakeups in the treacherous process of transportation, and that the thing, after all this effort, doesn't prove to be a dud.

**Assessing the financial costs.** The discussion so far has neglected to consider the financial costs of the extended operation in all its cumulating, or cascading, entirety, but these could easily become monumental. There would be expensive equipment to buy, smuggle, and set up, and people to pay--or pay off. Some operatives might work for free out of utter dedication to The Cause, but the vast conspiracy requires in addition the subversion of a considerable array of criminals and opportunists, each of whom has every incentive to push the price for cooperation as high as possible.

Alarmists Zimmerman and Lewis (2006) suggest the entire caper could be pulled off for \$10 million. The conspirators would be lucky to buy off three people with such a paltry sum. Moreover, the terrorists would be required to expose their ultimate goals to at least some of the corrupted, and at that point (if not earlier) they would become potential extortion victims. They could not afford to abandon unreliable people who know their goals (though they could attempt to kill them), and such people would now enjoy essentially monopoly powers ever to escalate their price. The cost of the operation in bribes alone could easily become ten times the sum suggested by Zimmerman and Lewis. And even at that, there would be, of course, a considerable risk that those so purchased would, at an exquisitely opportune moment of their choosing, decide to take the money and run--perhaps to the authorities representing desperate governments with essentially bottomless bankrolls and an overwhelming incentive to expend resources to arrest the atomic plot and to capture or kill the scheming perpetrators.

### **Evaluating the likelihood**

Even if there is some desire for the bomb by terrorists (something assessed more fully below), fulfillment of that desire is obviously another matter. Even alarmists Bunn and Wier contend that the atomic terrorists' task "would clearly be among the most difficult types of attack to carry out" or "one of the most difficult missions a terrorist group could hope to try" (2006, 133-34, 147). But, stresses George Tenet, a terrorist atomic bomb is "possible" or "not beyond the realm of possibility" (Tenet and Harlow 2007, 266, 279).

It might be useful to take a stab at estimating just how "difficult" or "not impossible" their task is, or how distant the "realm of possibility" might be. After all, lots of things are "not impossible." As I recall, there is a James Bond movie out there someplace in which Our Hero leaps from a low-flying plane or helicopter and lands unruffled in the back seat of a speeding convertible next to a bemused blonde. Although this impressive feat is "not impossible," it may not have ever been accomplished--or perhaps more importantly, ever attempted--in real life. Or it is entirely "not impossible" that a colliding meteor or comet could destroy the earth, that Vladimir Putin or the British could decide one morning to launch a few nuclear weapons at Massachusetts, George Bush could decide to bomb Hollywood, that an

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<sup>19</sup> For cheerful news about the difficulties of taking down the Brooklyn Bridge, see Kennedy 2003.

underwater volcano could erupt to cause a civilization-ending tidal wave, or that Osama bin Laden could convert to Judaism, declare himself to be the Messiah, and fly in a gaggle of mafioso hit men from Rome to have himself publicly crucified.<sup>20</sup>

In all this, Brodie's cautionary comment in the 1970s about the imaginative alarmists in the defense community holds as well for those in today's terrorism community, both of which are inhabited by

people of a wide range of skills and sometimes of considerable imagination. All sorts of notions and propositions are churned out, and often presented for consideration with the prefatory works: "It is conceivable that..." Such words establish their own truth, for the fact that someone has conceived of whatever proposition follows is enough to establish that it is conceivable. Whether it is worth a second thought, however, is another matter (1978, 83).

At any rate, experience thus far cannot be too encouraging to the would-be atomic terrorist. One group that tried, in the early 1990s, to pull off the deed was the Japanese apocalyptic group, Aum Shinrikyo. Unlike al-Qaeda, it was not under siege, and it had money, expertise, a remote and secluded haven in which to set up shop, even a private uranium mine. But it made dozens of mistakes in judgment, planning, and execution (Linzer 2004). Chagrined, it turned to biological weapons which, as it happened, didn't work either, and finally to chemical ones, resulting eventually in a somewhat botched release of sarin gas in a Tokyo subway that managed to kill a total of 12 people.

**Appraising the barriers.** As noted earlier, most discussions of atomic terrorism deal rather piecemeal with the subject--focusing separately on individual tasks such as procuring HEU or assembling a device or transporting it. But, as the Gilmore Commission, a special advisory panel to the President and Congress, stresses, building a nuclear device capable of producing mass destruction presents "Herculean challenges" and requires that a whole series of steps be accomplished. The process requires obtaining enough fissile material, designing a weapon "that will bring that mass together in a tiny fraction of a second, before the heat from early fission blows the material apart," and figuring out some way to deliver the thing. And it emphasizes that these merely constitute "the *minimum* requirements." If each is not fully met, the result is not simply a less powerful weapon, but one that can't produce any significant nuclear yield at all or can't be delivered (Gilmore 1999, 31, emphasis in the original).

Following this perspective, an approach that seems appropriate is to catalogue the barriers that must be overcome by a terrorist group in order to carry out the task of producing, transporting, and then successfully detonating Allison's "large, cumbersome, unsafe, unreliable, unpredictable, and inefficient" improvised nuclear device. Table 1 attempts to do this, and it arrays some 20 of these--*all* of which must be surmounted by the atomic aspirant. Actually, it would be quite possible to come up with a longer list: in the interests of keeping the catalogue of hurdles down to a reasonable number, some of the entries are actually collections of tasks and could be divided into two or three or more. For example, number 5 on the list requires that heisted highly-enriched uranium be neither a scam nor part of a sting nor of inadequate quality due to insider incompetence; but this hurdle could as readily be rendered as three separate ones.

In assembling the list, I sought to make the various barriers independent, or effectively independent, from each other, although they are, of course, related in the sense that they are sequential. However, while the terrorists must locate an inadequately-secured supply of HEU to even begin the project, this discovery will have little bearing on whether they will be successful at securing an adequate

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<sup>20</sup> Perhaps this last scenario is not as fanciful as it sounds. Now residing in a maximum security prison, the notorious Islamic terrorist Ramzi Yousef has let it be known that he has converted to Christianity ([60 Minutes](#), 14 October 2007).

quantity of the material, even though, obviously, they can't do the second task before accomplishing the first. Similarly, assembling and supplying an adequately equipped machine shop is effectively an independent task from the job of recruiting a team of scientists and technicians to work within it. Moreover, members of this group must display two qualities that, although combined in hurdle 9, are essentially independent of each other: they must be *both* technically skilled *and* absolutely loyal to the project.

**Assessing the probabilities.** In seeking to carry out their task, would-be atomic terrorists effectively *must* go through an exercise that looks much like this. If and when they do so, they are likely to find their prospects daunting and accordingly uninspiring or even dispiriting.

To bias the case in their favor, one might begin by assuming that they have a fighting chance of 50 percent of overcoming each of these obstacles even though for many barriers, probably almost all, the odds against them are much worse than that. Even with that generous bias, the chances they could successfully pull off the mission come out to be worse than one in a million, specifically they are one in 1,048,567. Indeed, the odds of surmounting even seven of the twenty hurdles at that unrealistically, even absurdly, high presumptive success rate is considerably less than one in a hundred. If one assumes, somewhat more realistically, that their chances at each barrier are one in three, the cumulative odds they will be able to pull off the deed drop to one in well over three billion--specifically 3,486,784,401. What they would be at the (entirely realistic) level one in ten boggles the mind.

One could also make specific estimates for each of the hurdles, but the cumulative probability statistics are likely to come out pretty much the same--or even smaller. For example there may be a few barriers, such as number 13, where one might plausibly conclude the terrorists' chances are better than 50/50. However, there are many in which the likelihood of success is almost certainly going to be exceedingly small--for example, numbers 4, 5, 9, and 12, and, increasingly, the (obviously) crucial number 1.

Those would be the odds for a single attempt by a single group, and there could be multiple attempts by multiple groups, of course. Although Allison considers al-Qaeda to be "the most probable perpetrator" on the nuclear front (2004, 29), he is also concerned about the potential atomic exploits of other organizations such as Indonesia's Jemaah Islamiyah, Chechen gangsters, Lebanon's Hezbollah, and various doomsday cults (2004, 29-42).<sup>21</sup> Putting aside the observation that few, if any, of these appear to have interest in hitting the United States except for al-Qaeda (to be discussed more fully below), the odds would remain long even with multiple attempts. If there were a hundred determined efforts over a period of time, the chance at least one of these would be successful comes in at less than one one-hundredth of one percent at the one chance in two level. At the far more realistic level of one chance in three it would be about one in 50 million. If there were 1000 dedicated attempts, presumably over several decades, the chance of success would be less than one percent at the 50/50 level and about one in 50,000 at the one in three level.<sup>22</sup>

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<sup>21</sup> He cites a 2001 newspaper account of a UN report supposedly suggesting that there were 130 terrorist groups "capable of developing a homemade atomic bomb" if they obtained sufficient fissile material (2006, 38). Actually, however, the account later says that the number comes from a list created by the State Department identifying organizations considered to pose "a nuclear, chemical *or* biological threat" (Edwards 2001, emphasis added).

<sup>22</sup> In all this, of course, everything depends on the plausibility of the probability estimates. Matthew Bunn has gone through a somewhat similar exercise and assigns probabilities that I consider to be wildly favorable to the terrorists (2006). In his model, for example, he assumes they stand a 40 percent chance of overcoming *everything* arrayed in barriers 8 through 15 of Table 1, and a monumental 70 percent chance of overcoming everything in barriers 16 through

These odds are for the most plausible scenario by means of which a terrorist group might gain a bomb: constructing one from HEU obtained through illicit means. As noted, there are other routes to a bomb: stealing a fully constructed one (or the HEU needed to make one) or being given one as a gift by a nuclear state. However, as also noted, those routes are generally conceded, even by most alarmists, to be considerably *less* likely than the one outlined in Table 1 to be successful for the terrorists.

Additionally, if there were a large number of concerted efforts, policing and protecting would presumably become easier because the aspirants would be exposing themselves repeatedly and would likely be stepping all over each other in their quest to access the right stuff. Also, the difficulties for the atomic terrorists are likely to *increase* over time because of much enhanced protective and policing efforts by self-interested governments--there is considerable agreement, for example, that Russian nuclear materials are much more adequately secured than they were ten or fifteen years ago (Pluta and Zimmerman 2006, 257).

Moreover, all this focuses on the effort to deliver a single bomb. If the requirement were to deliver several, the odds become, of course, even more prohibitive.

**Comparisons with the 9/11 conspiracy.** The difficulties confronting the 9/11 hijackers were considerable, but they were nothing like those confronting the atomic terrorist. The 9/11 conspirators did maintain extensive secrecy and group loyalty on their daring and risky endeavor, and their planning does seem to have been meticulous. But the size of the conspiracy was very small, they never had to trust strangers or criminals, technical requirements were minimal, obtaining flight training only took the money to pay for it, the weapons they used could legally be brought on planes, and, most importantly, they were exploiting an environment in which the policy was to cooperate with hijackers rather than fight and risk the entire plane--indeed, only a few months earlier three Muslim terrorists, in this case Chechens, had commandeered a Russian airliner and had it flown to Saudi Arabia where they were then overcome by local security forces with almost no loss of life (Kramer 2004/05, 58). Even at that, the 9/11 hijackers failed to accomplish their mission with the last of the four planes.

A comparison of the personnel requirements for each case may make this clear. The 9/11 plot necessitated the recruitment and the training (minimal, except for the pilots) of a single group of men who were absolutely loyal to the cause. However, aside from a general physical ability and a capacity to carry out orders, they needed little in the way of additional qualities. In the case of the terrorist bomb, the conspiracy--or, actually, the sequential sets of conspiracies--mandate the enlistment of a much larger number of people, and most of these must not only be absolutely loyal, but also extremely skilled at an elaborate series of technical, organizational, and conspiratorial tasks.

**The bottom line.** Keller suggests that "the best reason for thinking it won't happen is that it hasn't happened yet," and that, he worries, "is terrible logic" (2002). "Logic" aside, there is another quite good reason for thinking it won't happen: the task is bloody *difficult*. The science fiction literature, after all, has been spewing out for decades--centuries, even--a wealth of imaginative suggestions about things that might come about that somehow haven't managed to do so. We continue to wait, after all, for those menacing and now-legendary invaders from Mars.

Meanwhile, although there have been plenty of terrorist attacks in the world since 2001, all (thus far, at least) have relied on conventional destructive methods--there hasn't even been the occasional gas bomb. In effect the terrorists seem to be heeding the advice found in a memo on an al-Qaeda laptop seized

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20. With parameters like that, he is able to conclude that there is a 29 percent chance of a terrorist atomic bomb being successfully detonated in the next decade. See also the discussions in Posner 2005 and Sunstein 2006, 32.

in Pakistan in 2004: "Make use of that which is available...rather than waste valuable time becoming despondent over that which is not within your reach" (Whitlock 2007). That is: Keep it simple, stupid.

In fact, it seems to be a general historical regularity that terrorists tend to prefer weapons that they know and understand, not new, exotic ones (Rapoport 1999, 51; Gilmore 1999, 37; Schneier 2003, 236). Indeed, the truly notable innovation for terrorists over the last few decades has not been in qualitative improvements in ordnance at all, but rather in a more effective method for delivering it: the suicide bomber (Pape 2005, Bloom 2005).

### **Al-Qaeda's atomic progress, if any**

The degree to which al-Qaeda has pursued a nuclear weapons program may have been exaggerated--often by the same slam dunkers who alarmingly warned us about Saddam Hussein's WMD development. Meanwhile, the media, following conventional patterns, dutifully and mostly uncritically transmit the assertions put forward. In was on a November 14, 2004, 60 Minutes telecast, for example, that former CIA spook Michael Scheuer assured his rapt CBS interviewer that the explosion of a nuclear weapon or dirty bomb in the United States was "probably a near thing."

### **Bin Laden's reported "Hiroshima" crack and the uranium scam**

Stressing that "The greatest danger of another catastrophic attack in the United States will materialize if the world's most dangerous terrorists acquire the world's most dangerous weapons," the 9/11 Commission cites two specific indications that al-Qaeda is seeking nuclear weapons: reports from 1998 "that Bin Ladin's associates thought their leader was intent on carrying out a 'Hiroshima'" and evidence that "al Qaeda has tried to acquire or make nuclear weapons for at least ten years" (Kean 2004, 380; see also Allison 2006, 37).

Information about the "Hiroshima" crack obviously comes from third-hand reports speculating about Osama bin Laden's mindset. Moreover, the Commission elsewhere notes that the reports suggest he was hoping to inflict "at least 10,000 casualties" (Kean 2004, 116). Many times that many casualties were suffered at Hiroshima, and this could suggest that if bin Laden did utter the word, he was using it as many others have, as a synonym for a "major event," not necessarily an atomic one.

The only evidence the Commission supplies to support its conclusion that al-Qaeda had been working on nuclear weapons for at least ten years comes from an episode that took place around 1993 in Sudan when bin Laden's

business aides received word that a Sudanese military officer who had been a member of the previous government cabinet was offering to sell weapons-grade uranium. After a number of contacts were made through intermediaries, the officer set the price at \$1.5 million, which did not deter Bin Ladin. Al Qaeda representatives asked to inspect the uranium and were shown a cylinder about 3 feet long, and one thought he could pronounce it genuine. Al Qaeda apparently purchased the cylinder, then discovered it to be bogus. But while the effort failed, it shows what Bin Ladin and his associates hoped to do. One of the al Qaeda representatives explained his mission: "it's easy to kill more people with uranium" (Kean 2004, 60).

Information about this supposed venture comes mainly, perhaps entirely, from Jamal al-Fadl who defected from al-Qaeda in 1996 after he had been caught stealing \$110,000 from the organization. As Lawrence Wright relates in his prize-winning The Looming Tower, Fadl "tried to sell his story to various intelligence agencies in the Middle East, including the Israelis," but only found a buyer "when he walked into the American Embassy in Eritrea" (2006, 197). Although Fadl clearly lied repeatedly in early



interviews, some CIA investigators came to trust him, and he spun out his tale about the bogus uranium (Wright 2006, 5). He became a government witness, and by 2001 the government had spent nearly \$1 million on him (Mayer 2006). One of his FBI debriefers says, "He's a lovable rogue. He's fixated on money...He likes to please. Most people do" (Mayer 2006).<sup>23</sup>

In the text of his book Wright narrates the uranium story much the same way as the 9/11 Commission (2006, 191).<sup>24</sup> However, Wright also relays the testimony of the man who allegedly actually purchased the substance for bin Laden as well as of a Sudanese intelligence agent. Both asserted that, although there were other various scams going around at the time that may have served as grist for Fadl, the uranium episode never happened. Perhaps because an alarming tale in the hand is worth considerably more than two debunkings in the bush, Wright buries the conflicting testimony in a backnote (2006, 411-12).

Fadl was also a key inspiration for the CIA's notion that bin Laden was developing chemical weapons in Sudan, a supposition that eventually led in 1998 to the destruction by bombing of a Sudanese pharmaceutical plant, erroneously suspected of producing such a product (Wright 2006, 282). The loss of the vital medications the plant was actually making in that impoverished country may have led to the deaths of tens of thousands of Sudanese over time (Daum 2001, 19).<sup>25</sup>

### **Conversations with Pakistani scientists**

As a key indication of al-Qaeda's desire to obtain atomic weapons, Allison and many others have focused on a set of conversations in Afghanistan in August 2001 that two Pakistani nuclear scientists, Sultan Bashiruddin Mahmood and Abdul Majid, who had been working on relief and reconstruction programs in the country, reportedly had with Osama bin Laden, Ayman Zawahiri, and two other al-Qaeda officials (Allison 2004, 20-24). Allison's key source for information about these meetings is a front page Washington Post article written by Kamran Khan and Molly Moore and published in late 2001. It is based on information supplied by Pakistani intelligence officers, and the reporters were unable either to interview the scientists, who had been interrogated for two months by that time, or to determine (as the article puts it delicately) "the nature of the investigatory techniques being used."

The article says the "lengthy" (Allison uses the word "intense") conversations took place over "two or three" days (Allison says "three") and concerned chemical, biological, and nuclear weapons.

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<sup>23</sup> While under protective custody, Fadl won a prize in the New Jersey Lottery (Wright 2006, 197). The prize, however, was small, and his unamused FBI handlers wouldn't let him keep it anyway (Mayer 2006). Information about the "al Qaeda representative" who made the crack about how easy it is to kill people with uranium also comes from Fadl during court testimony in early 2001 in the United States vs. bin Laden case.

<sup>24</sup> In his discussion of the episode, Allison (2004, 26-27) neglects to mention that the material was bogus although his source specifically concludes, "It seems likely either that the material was not useful for a weapon or that it was one of many scams that have been perpetrated involving the sale of supposed nuclear material" (Benjamin and Simon 2002, 129). Allison also says Fadl "could not confirm whether the uranium actually changed hands," implying that there really was uranium up for sale. Additionally, he asserts that the material was "weapons-usable" although his source nowhere uses such language. By contrast, see the discussion based on the same source in Goldstein 2004, 134.

<sup>25</sup> Wright indicates that of all Sudan's pharmaceuticals, fully half were produced at the destroyed plant (2006, 282). William Cohen, Defense Secretary at the time, has admitted that information was so inadequate that policy-makers did not even know that the plant was producing medicine at all (Stern 1998-99, 178-79). The United States has thus far refused to apologize or offer compensation and has still not ruled out the possibility that the plant did have some "link" to the production of chemical weapons (Lacey 2005).

Allison contends that the talks were "especially about" nuclear weapons and that bin Laden was "particularly interested in nuclear weapons," but that emphasis does not appear in the Post article, the source he specifies. The Pakistani intelligence officers interviewed for that article characterize the discussions as "academic," and they also maintain that to be the descriptor the scientists "insisted" on using (see also Baker 2002).

They do report, however, that the scientists "described bin Laden as intensely interested in nuclear, chemical and biological weapons." This does suggest a degree of fascination with the subject, though I must say that when I have lectured about the effects and operations of such weapons, student interest has characteristically been considerable, maybe even at times intense. Also important: the scientists reportedly said that "bin Laden indicated he had obtained, or had access to, some type of radiological material that he said had been acquired for him by the radical Islamic Movement of Uzbekistan" and that he "asked them how the material could be made into a weapon or something usable." (Allison puts this more provocatively: the scientists were told that "Al Qaeda had succeeded in acquiring nuclear material for a bomb.") They then told him "it would not be possible to manufacture a weapon with the material he might have," a response Allison creatively renders as "Mahmood explained to his hosts that the material in question could be used in a dirty bomb but could not produce a nuclear explosion."<sup>26</sup>

Mahmood had been vocally sympathetic to militant Islamic groups and had advocated sending weapons grade plutonium and uranium to other Muslim states (not terrorist groups), positions that resulted in his being pressured to resign from office in 1999, two years before the conversations took place (Albright and Higgins 2003, 50). He is also something of a mystic, and has recommended that spirits be tapped as a free source of energy and is convinced that sunspots influence major human events, predicting in 1998 that 2002 would be a year of upheaval and that "millions, by 2002, may die through mass destruction weapons, hunger, disease, street violence, terrorist attacks, and suicide" (Fielding et al. 2002; Albright and Higgins 2003, 51). (In quoting this list of calamities, Allison sharpens it for his purposes by leaving out hunger, disease, and street violence.) Mahmood's talents as an economist are equally fanciful: it is his opinion that Afghanistan would have become a strong industrial country within 10 years had the United States not invaded in 2001 (Albright and Higgins 2003, 53).

It is possible to believe that the two scientists "provided detailed responses to bin Laden's technical questions about the manufacture of nuclear, biological and chemical weapons," as another Washington Post report puts it (Kahn 2001). But the questions do not seem to be very sophisticated, and as the scientists themselves have reportedly put it, it seems that the discussion was wide ranging and academic (even rather basic) and that they provided no material or specific plans (Kahn and Moore 2001).

Moreover, Pakistani officials stressed to Khan and Moore that Mahmood "had experience in

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<sup>26</sup> To further darken the issue, Allison says, quoting from another newspaper article, "Pakistani military authorities found it 'inconceivable that a nuclear scientist would travel to Afghanistan without getting clearance from Pakistani officials,' because Pakistan 'maintains a strict watch on many of its nuclear scientists, using a special arm of the Army's general headquarters to monitor them even after retirement.'" He also discloses that "American operatives have sought to intercept further 'vacations' in Afghanistan by Pakistani nuclear physicists and engineers" (2004, 23-24). But the Khan-Moore article makes it completely clear that Mahmood and Majid *did* have permission from the Pakistani government to travel to Afghanistan (they were allowed three trips in 2001), and it nowhere indicates that the trip was in any sense labeled a "vacation." Although Mahmood is not allowed to speak to reporters, his son is. According to him, "My father never went along." Bin Laden "asked him about how to make a bomb and things like that. But my father wouldn't help him. He told him, 'It's not so easy. you can't just build a bomb, you can't just do it with a few thousand rupees. You need a big institution. You should forget it'" (Baker 2002).

uranium enrichment and plutonium production but was not involved in bomb-building," and therefore that he "had neither the knowledge nor the experience to assist in the construction of any type of nuclear weapon," nor were the scientists "believed to be experts in chemical or biological weaponry" (see also Albright and Higgins 2003, 49, 51; Baker 2002). Therefore, they likely were incapable of providing truly helpful information because their expertise was not in bomb design, which might be useful to terrorists, but rather in the processing of fissile material, which is almost certainly beyond the capacities of a nonstate group. As a Pakistani nuclear scientist working at Princeton put it, Mahmood "may not actually have much more knowledge than you would get from an undergraduate degree in nuclear physics. My suspicion is if you gave him a bucket full of plutonium he wouldn't know what to do with it, because he never worked with nuclear weapons, as far as we know" (Baker 2002). Nonetheless, reports Allison, U.S. intelligence agencies have convinced themselves that the two errant Pakistani scientists provided al-Qaeda with a "blueprint" for constructing nuclear weapons (2004, 24).

### **Evaluating the evidence in Afghanistan**

Examining and assessing documents and other information uncovered by intelligence agencies and the media in Afghanistan after the fall of the Taliban in 2001, physicist David Albright concludes that "if al Qaeda had remained in Afghanistan, it would have likely acquired nuclear weapons eventually" and that "al Qaeda was intensifying its long-term goal to acquire nuclear weapons and would have likely succeeded if it had remained powerful in Afghanistan for several more years" (2002)

Albright's findings include the following:

Only a relatively small portion of the records found were about nuclear weapons or WMD, though perhaps some documents were destroyed or taken along on the flight.

A handwritten 25-page document entitled "Superbomb" was found. It has some relatively sophisticated sections while others are remarkably inaccurate or naive. It is not a cookbook for making nuclear weapons as many critical steps are missing, and it includes designs for atomic bombs that are not credible. It looks like the type used by lecturers at Arab universities.

Student notebooks suggest that people learning how to make conventional explosives were also given a brief primer at the end of the sessions about nuclear weapons.

There was no evidence al-Qaeda had acquired nuclear weapons or had collected a cadre of nuclear scientists or engineers.

Although their efforts in making nuclear weapons were far less sophisticated than known state programs, their determination to get nuclear weapons is "astounding."

If al-Qaeda had any visions at all about obtaining an atomic bomb, these seem to have been at most a distant glint based on some very limited and preliminary probes. That they may have had dreams at all is perhaps "astounding" given the rudimentary state of the group's science capacities, its limited resources, and its severe isolation.

Albright argues that the group "was putting together a serious program to make nuclear weapons," but it is difficult to see how one can come to that conclusion from the evidence he supplies. He seems to believe that they were creating something of a state-within-a-state, and that the Taliban government could provide cover while they, unnoticed, put together over time (it took Pakistan 27 years) the infrastructure necessary to build a bomb (including the production of fissile material) while importing the scientists, technicians, and material necessary to carry out the task.

CIA adviser and arms inspector Charles Duelfer has stressed that the development of nuclear

weapons in such a manner requires thousands of knowledgeable scientists and large physical facilities (Testimony before the Senate Select Committee on Intelligence, 6 October 2004; see also Seitz 2004, Allison 2004, 98; Wirz and Egger 2005). Pakistan would seem to have been the logical, and perhaps only possible, supplier. Albright suggests that, although "al Qaeda's nuclear program seems to have been relatively primitive," Pakistani scientists like Mahmood "would probably have provided extensive and ongoing assistance" if the 9/11 attacks had not led to cutting off contacts between Pakistani scientists and al-Qaeda (that is, the invasion of Afghanistan was not required for this).<sup>27</sup>

However, the Pakistanis were keeping careful watch on their scientists and materials even before 9/11--specifically, Mahmood had, as noted, been sacked merely for suggesting aiding the nuclear programs of other Muslim states (not terrorists), and they had allowed him only three visits to Afghanistan in all of 2001 (Khan and Moore 2001). This process was much intensified after Pakistan's A. Q. Khan network--which had informally supplied nuclear information to several states (but not to the Taliban or to any substate groups)--was exposed in 2004 (Langewiesche 2007, chs. 3-4).

Be all that as it may, Albright concludes that any al-Qaeda atomic efforts were "seriously disrupted"--indeed, "nipped in the bud"--by the invasion of Afghanistan in 2001. Whatever his evaluation of the situation before the invasion, Albright concludes that after the attack "the overall chance of al Qaeda detonating a nuclear explosive appears on reflection to be low" (2002).

### **Rumors of the purchase of loose nukes**

Allison soberly relays--without the slightest effort at critical evaluation much less skepticism--a report of an Arabic-language magazine that bin Laden's agents by 1998 had purchased no less than twenty nuclear warheads "from Chechen mobsters in exchange for \$30 million in cash and two tons of opium" (2004, 27). Allison's source is a Seattle Times article which also notes that the magazine report and other ones from the time inspired "a spate of alarming, unconfirmed and exaggerated news reports" that played off those original reports and that these, themselves, remain unconfirmed (Port and Smith 2001). Very much in the game is the London Times which suggested that bin Laden had already collected tactical nuclear weapons by 1998 (Binyon 1998). If any of those reports are true, one might think the terrorist group (or their Chechen suppliers) would have tried to set one of those things off by now.

Absence of evidence, we need hardly be reminded, is not evidence of absence. Thus, Allison approvingly reports that, when no abandoned nuclear weapons material was found in Afghanistan, some intelligence analysts responded, "We haven't found most of Al Qaeda's leadership either, and we know that they exist" (2004, 28). Since we know Mount Rushmore exists, maybe the tooth fairy does as well.<sup>28</sup>

Allison also reports a claim by Pakistani journalist Hamid Mir that Zawahiri, bin Laden's second in command, told him in 2001 "If you have \$30 million, go to the black market in central Asia, contact any disgruntled Soviet scientist and...dozens of smart briefcase bombs are available. They have contacted us, we sent our people to Moscow, to Tashkent, to other states, and they negotiated, and we purchased some suitcase bombs" (2004, 27). As he acknowledges in a note, Allison gets this alarming, even incendiary, quote from a San Francisco Chronicle article that is entitled, "Al Qaeda bluffing about having

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<sup>27</sup> On the post-9/11 cutoff of contact, see Albright and Higgins 2003, 54-55; Suskind 2006, 69-70, 122.

<sup>28</sup> Paul Williams has written at least two books proclaiming the likelihood of a nuclear attack on the United States in the near future. In the most recent of these, he concludes "It could occur within a month or a year or two. But most experts believe it will happen soon....As this book goes to press, millions of Americans may be living on borrowed time" (2005, 205). The publication date of this book is September 6, 2005. Looks like we've dodged yet another bullet.

suitcase nukes, experts say; Russians claim terrorists couldn't have bought them." The portion of that article that apparently did not interest Allison notes, as discussed earlier, that Russian nuclear officials and experts on the Russian nuclear programs "adamantly" deny that al-Qaeda or other terrorist groups could have bought Soviet-made suitcase nukes (Badken 2004).

### **Hamid Mir's interview**

Mir was brought in to interview bin Laden just a day or two before al-Qaeda was to flee from the American invasion in Afghanistan in 2001. There are varying published texts of what was actually said, but in one of them bin Laden supposedly asserted, "If the United States uses chemical or nuclear weapons against us, we might respond with chemical and nuclear weapons. We possess these weapons as a deterrent" (Lawrence 2005, 142n). Bin Laden declined to discuss the weapons' origins but, according to Mir, Zawahiri separately expanded with the comment above saying they had bought some nuclear suitcase bombs in Russia.<sup>29</sup>

Given the military pressure they were under at the time, and taking into account the evidence of the primitive nature of al-Qaeda's nuclear program (if it could be said to have had one at all), the reported assertions by the two al-Qaeda leaders, while unsettling, appear to be best interpreted as a desperate bluff or, if you wish, flagrant lies.<sup>30</sup> Nonetheless they have often been uncritically accepted at face value (Albright 2002; Goldstein 2004, 13).

### **Other bin Laden statements**

Bin Laden has pronounced on the nuclear weapon issue a few other times. The statements can be seen to be threatening, but they are rather coy and indirect, indicating perhaps an interest, but not acknowledging a capability.

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<sup>29</sup> In a 2002 interview, Mir discussed the circumstances of the interview. In it he says, contradicting the published transcript of the interview (Lawrence 2005, 142), that bin Laden told him he had bought a nuclear bomb from a Russian scientist and "had it in a suitcase." He does not mention meeting Zawahiri at all. [www.maldivesculture.com/maldives\\_osama\\_bin\\_laden.html](http://www.maldivesculture.com/maldives_osama_bin_laden.html). Mir also discussed the interview in conversation in 2004 with Andrew Denton of Australian television. In this he says bin Laden "never allowed me to probe his claim that he has nuclear weapons," but that Zawahiri, who Mir thinks is "the real brain behind bin Laden" and "the real strategist," told him about purchasing the Russian suitcase bombs. [www.abc.net.au/tv/enoughrope/transcripts/s1071804.htm](http://www.abc.net.au/tv/enoughrope/transcripts/s1071804.htm). In a 2006 interview, Mir made a number of assertions relying "on my own investigations," not simply "on claims by al-Qaeda," that bear questioning. 1. Iran is supporting al-Qaeda. 2. Russia is supporting the Taliban insurgents in Afghanistan. 3. Al-Qaeda smuggled three suitcase nuclear weapons into Europe in 2000 destined for London, Paris, and California. 4. It has smuggled many kilos of enriched uranium into the United States for dirty bomb projects. 5. It tested at least one dirty bomb in Afghanistan in 2000. 6. Before 9/11, 42 trained fighters entered the United States, leaving 23 still "sleeping" there. 7. Al-Qaeda can make anthrax. 8. It hasn't struck yet because it is "waiting for the proper time." [www.canadafreepress.com/2006/mauro052506.htm](http://www.canadafreepress.com/2006/mauro052506.htm). Mir is writing a biography of bin Laden. In the 2002 interview he said he was "finishing the book" and would be "trying to publish it soon." In the 2006 interview he said that he was "putting some finishing touches on the manuscript," that his publisher had not authorized him to "disclose the name of the book," that it would reveal bin Laden's "future plans and details of his nuclear designs," and that he was "planning to publish the book this year."

<sup>30</sup> Comparable, perhaps, to some of the pronouncements issued around the same time by Mullah Omar, leader of the Taliban in Afghanistan, who was also under siege. Contacted by the BBC, Omar spouted about "the destruction of America" and claimed that a plan to do so "is being implemented. But it is a huge task, which is beyond the will and comprehension of human beings. If God's help is with us, this will happen within a short period of time; keep in mind this prediction." "Interview with Mullah Omar," [news.bbc.co.uk/2/hi/south\\_asia/1657368.stm](http://news.bbc.co.uk/2/hi/south_asia/1657368.stm)

This, in December 1988 he said "We supported and congratulated the Pakistani people when God blessed them with possession of a nuclear weapon, because we consider it the right of the Muslims' to have it" (Lawrence 2005, 72). Around the same time he was asked by Time about reports that he was trying to acquire nuclear and chemical weapons. His reply:

This is a multi-dimensional question. It presupposes that I do possess such weapons, and goes on to ask about the way in which we will use them. In answer, I would say that acquiring weapons for the defense of Muslims is a religious duty. To seek to possess the weapons that could counter those of the infidels is a religious duty. If I have indeed acquired these weapons, then this is an obligation I carried out and I thank God for enabling us to do that. And if I seek to acquire these weapons I am carrying out a duty. It would be a sin for Muslims not to try to possess the weapons that would prevent the infidels from inflicting harm on Muslims. But how we could use these weapons if we possess them is up to us.<sup>31</sup>

### **Al-Qaeda's capacity**

It may be useful in this connection to consider al-Qaeda's capacity more broadly. Two publications from Washington think tanks, one authored by Anthony Cordesman of CSIS (2005, 29-31), the other by Brian Jenkins of RAND (2006, 179-84), have independently provided lists of violence committed by Muslim extremists outside of such war zones as Iraq, Israel, Chechnya, Sudan, Kashmir, and Afghanistan, whether that violence be perpetrated by domestic terrorists or by ones with substantial international connections. Included in the count are such terrorist attacks as those that occurred in Bali in 2002, in Saudi Arabia, Morocco, and Turkey in 2003, in the Philippines, Madrid, and Egypt in 2004, and in London and Jordan in 2005. The lists include not only attacks by al-Qaeda, but also those by its imitators, enthusiasts, and wannabes as well as ones by groups with no apparent connection to it whatever.

Although these tallies make for grim reading, the total number of people killed in the five years after 9/11 in such incidents comes to some 200-300 per year. That, of course, is 200-300 too many, but it hardly suggests that al-Qaeda's destructive capacities are monumental. By comparison, over the same period far more people have perished in the United States alone in bathtubs drownings (Stossel 2004, 77) or in automobile accidents by people who have abandoned short-haul air flights because of the increased costs and waiting time imposed after 9/11 by the Transportation Security Administration (Ellig et al. 2006, 35).

### **Conclusion**

William Arkin has issued a sustained lament about what he calls "the devastating consequences associated with the universal and unchallenged assumption of nuclear terrorism." Among them: the war in

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<sup>31</sup> [jya.com/bin-laden-abc.htm](http://jya.com/bin-laden-abc.htm). Additionally, a State Department "Fact Sheet," apparently issued in 1998, contained this statement:

On or about May 29, 1998, bin Laden issued a statement entitled "The Nuclear Bomb of Islam," under the banner of the "International Islamic Front for Fighting the Jews and Crusaders," in which he stated that "it is the duty of Muslims to prepare as much force as possible to terrorize the enemies of God."

(see [fas.org/irp/news/2000/12/irp-001205-afgzss2.htm](http://fas.org/irp/news/2000/12/irp-001205-afgzss2.htm)) This exact statement has been repeated frequently (including Allison 2004, 19, without source reference), but I have not been able to find the text of the full bin Laden statement to discover whether the title of the supposed statement actually refers to nuclear weapons themselves or whether the term is being used metaphorically.

Iraq, the single-minded attention to WMD that seduced federal agencies "to prepare for the wrong disaster before Katrina," the rise of "preemption," and the "resurgence of American nuclear capability and missile defenses" (2006, 43). To that catalogue one might add the amazing, hugely costly, and, it would appear, quite unwarranted preoccupation about detecting radioactive parcels in materials arriving at U.S. ports, a quixotic obsession that currently triggers 500 false alarms daily generated by such exotic substances as kitty litter and bananas in the Los Angeles/Long Beach port alone (Fessler 2007).

The potential for atomic terrorism may indeed be the single most serious threat to the national security of the United States. Assessed in appropriate context, however, that could actually be seen to be a comparatively cheering conclusion. Sensible cost-effective policies designed to make that probability even lower may be justified, given the damage that can be inflicted by an atomic explosion. But, as Arkin suggests, unjustified alarmism about the likelihood and imminence of atomic terrorism has had policy consequences that have been costly and unnecessary.

**Table 1: The atomic terrorist's task in the most likely scenario**

- 1 An inadequately-secured source of adequate quantities of highly-enriched uranium (HEU) must be found
- 2 The area must be entered while avoiding detection by local police and by locals wary of strangers
- 3 Several insiders who seem to know what they are doing must be corrupted
- 4 All the insiders must remain loyal throughout the long process of planning and executing the heist, and there must be no consequential leaks
- 5 The insiders must successfully seize and transfer the HEU, and the transferred HEU must not be a scam or part of a sting and it must not be of inadequate quality due to insider incompetence
- 6 The HEU must be transported across the country over unfamiliar turf while its possessors are being pursued
- 7 To get the HEU across one or more international borders smugglers must be employed, and they must remain loyal despite the temptations of massive reward money even while no consequential suspicion must be generated in other smugglers using the same routes who may be interested in the same money
- 8 A machine shop must be set up in an obscure area with imported, sophisticated equipment without anyone becoming suspicious
- 9 A team of highly skilled scientists and technicians must be assembled, and during production all members of the team must remain absolutely loyal to the cause and develop no misgivings or severe interpersonal or financial conflicts
- 10 The complete team must be transported to the machine shop, probably from several countries, without suspicion and without consequential leaks from relatives, friends, and colleagues about the missing
- 11 The team must have precise technical blueprints to work from (not general sketches) and must be able to modify these appropriately for the precise purpose at hand over months (or even years) of labor, and without being able to test
- 12 Nothing significant must go wrong during the long process of manufacture and assembly of the improvised nuclear device (IND)
- 13 There must be no inadvertent leaks from the team
- 14 Local and international police, on high (even desperate) alert, must not be able to detect the project using traditional policing methods as well as the most advanced technical detection equipment
- 15 No locals must sense that something out of the ordinary is going on in the machine shop with the constant coming and going of non-local people
- 16 The IND, weighing in a ton or more, must be smuggled without detection out of the machine shop to an international border
- 17 The IND must be transported to the target country either by trusting the commercial process filled with people on the alert for cargo of this sort or by clandestine means which requires trusting corrupt co-conspirators who also know about the reward money
- 18 A team of completely loyal and technically accomplished co-conspirators must be assembled within, or infiltrated into, the target country
- 19 The IND must successfully enter the target country and be received by the in-country co-conspirators
- 20 A detonation team must transport the IND to the target place and set it off without anybody noticing and interfering, and the untested and much-traveled IND must not prove to be a dud



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