Chapter 11 NONPROLIFERATION AND NUCLEAR TERRORISM

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Because of its consequences, an act of nuclear terrorism is the most dangerous of the many new threats to international and national security. If a nuclear device of even relatively low power were to be exploded in the center of a large modern metropolis, it could lead to the death and injury of hundreds of thousands of people, as well as to extremely serious economic damage. So far, not a single terrorist organization has managed to acquire nuclear munitions or nuclear materials at a level of enrichment or in the quantity necessary to create a nuclear weapon. According to many experts, nuclear terrorism is the least probable scenario of terrorism involving a weapon of mass destruction. Even those terrorist networks and groups that use WMDs or are most frequently associated with attempts to acquire them are more substantially involved with chemical and biological arms. But that said, more steadfast political attention is paid specifically to the threat of nuclear terrorism,[1] especially in the United States, than to all the other forms of WMD or conventional terrorism.

There are two reasons for this. First of all, if terrorists were to use a nuclear weapon, it would lead to enormous human loss and colossal economic and cultural damage. Both now and in the foreseeable future, it is unlikely that terrorists will be in a position to inflict such destruction through chemical or biological means. Secondly, there are means of protection available in the event that poisonous chemical materials are applied. And if biological agents are used, there are likewise tools available for prevention, for treatment of those affected, and for undertaking other sanitary and epidemiological courses. But there are no measures of defense against nuclear weapons, nor any measures that could be conducted after a nuclear explosion that would be capable of even marginally limiting the damage inflicted; the negative consequences of such an explosion would inevitably be felt for decades, at the very least.

Considering the potentially catastrophic consequences of an act of nuclear terrorism, it is by no means unreasonable that the world's leading powers devote their strongest warning and prevention efforts to counteract such a threat. Unfortunately, scientific and technological progress and the ongoing processes of globalization (especially in the exchange of information, technology, material and financial resources, the migration of experts and the intensification of means of communication, etc.) all lead to an increase in the accessibility of nuclear technology and the appearance of new possibilities for terrorist groups to act without regard to state borders. The attempts of a number of countries to obtain nuclear weapons promoted the development of the nuclear black market, a phenomenon that is capable of radically easing terrorists' access to nuclear weapons and their ability to use nuclear materials for terrorist purposes. Further nuclear proliferation could lead to the exponential growth of this threat. There is a growing number of failed states, where a weak central government is not likely to have dependable control over terrorist organizations that are formally located on its territory. This allows terrorist organizations to exist and to use some states' territories for their activities, including the acquisition of WMD.

Even though the main powers of the world understand this danger, they have not as yet been able to produce, except on paper, a united strategy that would effectively suppress nuclear terrorism. The powers are divided as to the primary sources of international terrorism and methods of combating it, and they have contradictory collateral political interests, which they often place higher than the priorities of fighting nuclear terrorism. Moreover, they sometimes undertake steps contrary to the opinion of the majority of the international community, which weakens solidarity in the face of the most pressing security threats and compromises the goal of fighting proliferation and terrorism – thus actually encouraging the further expansion of terrorism and nuclear proliferation. If this situation does not change, the issue will no longer be whether or not there is a risk of nuclear terrorism. Rather, the issue will be when, where, and on what scale the first act of nuclear terrorism will be committed.

Stimuli and Limitations of the Potential Use of Weapons of Mass Destruction by Terrorist Groups

The Basic Types of Terrorism

There are two levels of terrorism: global (superterrorism), and local, or local-regional. The latter includes terrorism that, as one of its tactics, takes up arms

in specific military-political conflicts or uses terrorism as a particularly extreme form of political extremism, for example, on the far right (including nationalist, chauvinist, and fascist groups), or on the far left. The political goals of localized groups (including those that control particular territory) are relatively less ambitious: the capture of power, the formation of independent states, the fight against occupational forces – these goals all fall within the local-regional context. Even though the fiscal, administrative and propagandist infrastructure of such groups is frequently international, their agenda is essentially focused on a specific local conflict or political problem, that is, *localized*. The terrorist activities of groups that are pursuing goals limited to local-regional frameworks are conducted with relatively limited means. Even the most destructive and deadly terrorist acts of this type (for example, terrorist acts leading to the mass death of civilian hostages) are often implemented with standard and relatively accessible weapons, munitions, and techniques. In isolated situations they might even use primitive devices, including homemade ones (like Palestinian or Chechen suicide bombers, for example).

Along with terrorism in its more traditional forms and manifestations, events originating in the late 20th and early 21st centuries demonstrate a new phenomenon, so-called superterrorism, catastrophic- or megaterrorism. The terrorist acts of September 11, 2001 were the largest act of superterrorism to date. However, manifestations of this phenomenon had arisen even earlier – for example, the terrorist acts in the Tokyo subway in 1995 could also be regarded as superterrorism. A series of superterrorist acts have taken place after September 11, 2001 – from Bali to Istanbul. Superterrorism is inherently global or, at a minimum, strives toward a global scale, and once launched is not clearly attached to any one political problem or specific local conflict. The structure, operative network, cash flow, and strategies of the superterrorist network of al-Qaeda have a definite global nature and have spread to both highly developed countries in the global North, and to weakly developed regions in the global South.

That said, the fundamental targets of superterrorism are connected first and foremost within the developed world; they are either directly in developed countries or are linked to them. In order to attack these targets successfully, it is necessary for a terrorist network to adjust its infrastructure and support bases, to secure finances, to receive training (or, preferably, education) in the developed world, that is, to be or become a part of that world. In comparison with terrorism used as a tactic for addressing a specific political problem or as a front in a specific armed conflict, superterrorism pursues *limitless goals.* Generally, superterrorists do not view these goals as an object for negotiations. Some possible

examples are al-Qaeda's aspiration to change the international situation and to affront the West as a whole, or the Japanese religious sect Aum Shinrikyo's idea of world supremacy. Limitless goals, as a rule, assume the use of more advanced and highly technological means. Moreover, they can also require the use of *unlimited means*, including WMDs. Beyond all else, this implies that the traditional criteria for defining normal terrorism, such as the premeditated use of civilians and material assets as victims and targets, have less significance for superterrorism using WMDs insomuch as this type of terrorism is inherently less selective in nature, making the delineation between military and civilian targets lose its meaning.[2]

Terrorists' Motivations

As practice has proven, groups for which ideology holds an important place or groups that are perhaps dominated by religious motives are more inclined to irrational behavior. Given the presence of other conditions, this could create a more favorable ideological and motivational base both for committing acts involving the mass destruction of human life in general, and for attempts at acquiring, creating, and using nuclear, radiological, and other types of WMDs in particular. Terrorist violence that has strong religious motivation perceives itself as a "sacred cause", which could substantially weaken any limitations (political, interorganizational, moral, and others) on committing mass murder.[3] Religious motivations are present to various degrees in the ideologies of both of the most famous superterrorist organizations, al-Qaeda and Aum Shinrikyo. While the first is most commonly associated with possible attempts at acquiring WMDs, the second has actually managed to create and use the neuro-paralytic sarin gas, as well as biological pathogens. In light of this, specifically in Aum Shinrikyo's ideology as a religious sect, apocalyptic motives dominated. Moreover, the worldview of the sect's leader, Shoko Asahara, and his idea on world supremacy were to a significant degree *based* on the possibility of applying WMDs as a peculiar method of "hastening" or "provoking" the forthcoming "apocalypse".

As for al-Qaeda, even though this superterrorist network's ideology has a religious-extremist component, the global nature of al-Qaeda's goals is not merely and not so much a reflection of religious beliefs as it is a peculiar political and moral reaction to the global nature of America's presence. Despite the abundance of fundamentalist rhetoric in the declarations of Bin Laden himself, as well as from other al-Qaeda leaders, there is no point in placing an absolute equal sign between their frequently cited fundamentalist statements and their real actions

and goals. In contrast with the group Aum Shinrikyo and its leader, neither Bin Laden nor his comrades are religious fanatics, whose activities are dominated by irrational motives and who are not capable of contending with reality.

To the contrary, what is characteristic for al-Qaeda is delicate political calculation, a smooth system of propagandist activity, and careful planning of operations. To this day, the majority of al-Qaeda's terrorist attacks have been committed using common explosives and highly varied delivery systems, including suicide airplanes. Still, in view of the superterrorist nature of al-Qaeda, the global and total nature of its goals, its demonstrated readiness to conduct terrorism with an unprecedented scale of human victims, this network's intentions regarding the possible use of WMDs provoke reasonable anxiety from the world community.

That said, intelligence on al-Qaeda's possibilities in this realm is highly fragmentary, and their authenticity is difficult to verify.[4] Information on this account, contained in the CIA's corresponding materials, hardly clarifies the situation. Both the CIA's and the FBI's information speaks of the possibility that al-Qaeda has access not so much to nuclear as to chemical materials and that there are "primitive possibilities for producing mustard gas, sarin, and VX."[5] Even the declarations of representatives from al-Qaeda itself are ambiguous in nature. A typical example is Bin Laden's declaration that "we can neither confirm nor deny our possession of these weapons."[6] On the one hand, neither Bin Laden nor his cronies, obviously, intend to refute the possibility that they will use these materials, even despite a whole series of negative political and practical consequences that such a step would have for the organization's own activity. This could partly be explained as an attempt to create additional means of frightening the United States, though for now they are only declarative in nature.

There is a whole series of other factors that hinder terrorist groups' efforts to gain access to WMDs and related materials. First, there is the issue of the requisite financial resources. The potential financial expenses needed to acquire, store, and use nuclear and other WMDs significantly exceeds the resources that terrorist groups spend on common armaments, materials, and techniques. Accordingly, very few groups are capable of acquiring, maintaining, and storing – let alone creating – such materials.[7]

Secondly, one of the most important obstacles remains the technical complexity of creating and storing such materials, and the fact that working with them demands a certain level of technical expertise. Only in exceptional circumstances are terrorist groups capable of bringing together the experience, knowledge, materials, and equipment necessary for conducting unconventional

attacks of a scale sufficient to surpass the effects of modern terrorist attacks that lead to massive casualties but use conventional means. To date, of all the non-state players only al-Qaeda and Aum Shinrikyo have demonstrated activity of the level and scale necessary to launch independent programs for creating, acquiring, and storing WMDs (in particular, Aum Shinrikyo could boast scholars with the necessary knowledge and experience and commands significant technological resources).

The third issue is whether the environment in which terrorists operate affords them access to unconventional materials. This is specifically related to the threat of terrorism with the use of a nuclear weapon. The creation of nuclear weapons demands materials that, unlike a few other unconventional means, even superterrorist groups could hardly produce independently. In western literature, this idea is expressed simply: "no materials – no bomb."[8]

New Possibilities

The division of terrorism into local groups, totally uninterested in the application of WMDs, and global groups, interested in using unconventional means, is not without debate. For example, the Aum Shinrikyo sect showed a rather great interest in WMDs, guided by an ideology of global apocalypse, while committing the bulk of its terrorist attacks on the territory of one country, Japan. Therefore, it can be aligned with global terrorist networks like al-Qaeda only with some reservation. At the same time that the latter strove to spread its terrorism as widely as possible across the globe, the Japanese sect used its foreign divisions predominately for financing, organizational and logistical support, and, possibly, for gaining access to technology and expertise on WMDs.

Another example of WMD terrorism that bears no signs of any global terrorist organization is the distribution of anthrax by mail in the United States in 2001. In their style, these attacks resemble the methods used by local organizations and individual terrorists in both the United States and Europe, who have repeatedly sent packages with explosives to chosen addresses. In this case, the letters containing biological pathogens were not accompanied by any specific demands, a fact uncharacteristic of traditional terrorist groups. However, neither were such demands advanced during the second largest terrorist act committed in the United States, the explosion of the Oklahoma City Federal Building in the mid-1990s. Afterwards, it emerged that this explosion was committed as revenge for actions taken by American authorities against a fundamentalist Christian sect in the southwest of the country; in other words, it was motivated by local and not global considerations.

Nevertheless, the blurry lines dividing the various types of terrorism mean that it is entirely possible that a group that previously showed no interest in WMDs may now be very interested indeed. The attacks in New York and on the Pentagon on September 11, 2001 demonstrated that the goals and methods of committing a large-scale act of terrorism may take unexpected forms. In addition to using chloride in Sri Lanka, attempts were made to apply chloride during the seizure of Grozny in 2000, and the West considers that these were attempts of "local" Chechen terrorists. Moreover, in 1995, Chechens stashed a container of low-level nuclear materials in Izmaylovsky Park in Moscow, and used it in the propaganda war with the federal government.

As globalization deepens, the opportunities open to terrorist groups widen. Local organizations can use the capabilities of ever-broader networks of foreign affiliates to further their goals, widening the potential for new global networks to appear. Accordingly, there is new potential for interaction between terrorist groups. It would seem that the existing ideological discords between many of these groups limit the prospects for such collaboration, thus making a hypothetical global "terrorist international" virtually unthinkable. However, terrorists are fully prepared to receive WMDs from other groups. One group might lose interest in materials it arranged to acquire, opting instead to sell them to interested groups and thus raise finances, under the condition that the WMDs being sold would not be used in the country where the seller operates.

The Black Market

Over the course of the last decade, the development of the black market for WMDs has begun anew. This stems in part from global scientific and technological progress, having made many WMD technologies accessible for a large number of states, as well as from the aspiration of a number of countries to acquire weapons of mass destruction, including nuclear arms. Given the development of international export control regimes, it is becoming increasingly difficult to acquire such technologies through legal means, thus inevitably providing further impetus for the growth of the black market.

A substantial contribution to the formation of the WMD black market was made by the repeated proliferation of related materials into new countries, in particular into those outside the traditional nuclear club. The new owners of nuclear weapons had not made any nonproliferation pledges. This meant that these states, once they went nuclear, had only immature control mechanisms against the illegal export of sensitive materials, exacerbated as well by a negative attitude to nonproliferation on the part of many regimes. It is no accident that the first

broad international network trading in illegal nuclear technologies to gain notoriety was headed by the father of Pakistan's nuclear bomb, Abdul Qadeer Khan. As far as can be judged, Khan's network arose during the period when Pakistan was actively importing nuclear technology from other states, both legally and illegally. After Islamabad acquired a nuclear weapon, this network expanded its activity to other countries. In other words, it became a sort of multiplier of nuclear proliferation, involving all sorts of new states and companies in its trade. Khan's network is suspected of supporting nuclear programs in Libya, Iran, the DPRK, and possibly Myanmar. It made wide use of intermediary companies from third countries, in particular Malaysia and the United Arab Emirates.

So far as is known, the clients of Khan's network have to date turned out to be nations and not terrorist groups. However, over time it evolved from being a network created by Pakistani authorities in order to achieve goals set by Islamabad into a semiautonomous formation. It is unlikely that it could have continued to function without the leadership or concealed support from a portion of the Pakistani government and military. But the breadth and character of supplies shows that it departed from being a tool for achieving specific political goals – assisting in the creation of Pakistan's nuclear weapons – and into more of a commercial enterprise, providing supplies to anyone willing to pay.

The further expansion of the number of states possessing nuclear technology means it is possible that several new networks similar to Khan's could appear. Along with the quantitative increase of such networks, one might also predict an expansion in their client base, including terrorist organizations. In other words, repeated proliferation has not just led to the appearance of nuclear weapon technology in totally new states, but has also promoted the creation and build-up of black-market mechanisms in the trade of nuclear materials and technologies. Thus, states that create such mechanisms for achieving their own specific goals eventually lose control over the networks' increasingly widening activity.

The appearance and likely growth of the nuclear black market has created a qualitatively new set of circumstances. While this market was still immature, there were insufficient incentives to steal nuclear materials. In the mid-1990s in particular, a number of cases of theft of nuclear materials were stopped in Russia, precisely because the thieves were unable to connect with buyers. For example, in 1992 an engineer at the Luch facility, located near Moscow in Podolsk, managed to steal a significant amount of enriched uranium without anyone noticing. Not having any connections with underground dealers, he decided to set off to Moscow with the stolen containers in order to sell the materials at one of the local markets. Along the way, he was stopped and detained by law enforcement

officers.[9] Several experts argue that the storage of nuclear materials in Russia and other post-Soviet states during the early 1990s was relatively safe and, indeed, saw no serious breaches precisely because the black market was poorly developed.[10] The emergence of the black market and its gradual globalization greatly increased stimuli for stealing WMDs and developing more and more refined schemes for gaining illegal access to them.

It is only natural for the activity of networks like Khan's to corrupt the state apparatus of the countries where they are based. It is obvious that the Pakistani network had at its disposal strong connections within the state apparatus, the national security agencies, and the nuclear sector overseeing its activity in the process of acquiring nuclear potential for the nation. Subsequently, as the network reoriented its activities from import to export, these connections began to be used as a means of receiving the necessary materials and technologies, and also for unhampered export out of the country. Thus, the activity of Khan's network brought to light yet another dangerous tendency: the involvement of key state bureaucrats and, possibly, whole government or government-related structures in illegal nuclear activity. This involvement radically widens the range of technology and materials available to black-market dealers. Accordingly, terrorist organizations have easier access to WMDs.

In addition to new nuclear states, another problem is presented by failed states. They may provide terrorist groups with asylum, allowing them to escape the pursuit of security agencies. The availability of the territories of failed states significantly increases a terrorist organization's ability to conduct scientific research, tests and the industrial activity needed to create their own WMDs. Terrorists can both rely on these states' infrastructures and create their own facilities. Within a "normal" country, however, such activity would be limited, to the extent that it would be resisted by the state, from the central government to local authorities.

The world has seen a sufficient number of failed states. The most well known example is Afghanistan, where until the end of 2001 the Taliban regime ruled, not only tolerating al-Qaeda, but actually allying itself with it. Based in Afghanistan, al-Qaeda's highest-ranking cadres led the global terrorist network, created a training camp for militants, and attempted to acquire WMD technology from the Central Asian states of the former Soviet Union. In another case, Chechen terrorists based in Georgia's Pankisi Gorge worked to develop biological pathogens for terrorist attacks in Russia. After the end of the Cold War, the problem of failed states became particularly acute. The former leaders of the conflicting blocs that once dominated the world generally lost interest in the countries that they had earlier supported as part of their global confrontation, but that

had become economically hopeless. Victims of such situations included many countries of Africa, the Greater Middle East,[11] and South East Asia. Several post-Soviet states had insufficient experience in self-government and for a time were unable fully to govern their territories. Thus, a few of them might also be placed in the category of failed states. Despite efforts undertaken in the last few years, the problem of failed states will remain relevant in the foreseeable future. Consequently, as law enforcement activity becomes more effective in "normal" states, these countries will become more and more attractive to international terrorist groups, foremost those interested in creating WMDs.

Political Dimensions

The effectiveness of the fight against international terrorism, including the potential terrorist use of nuclear weapons and materials, is significantly undermined by three circumstances:

- The inadequacy of the international legal regime in the fight against nuclear terrorism;
- Discord within the international antiterrorist coalition; and
- The differing priorities of Russia and the United States.

The military intervention against Iraq in 2003, undertaken by a voluntaristic coalition of nations led by the United States, aggravated the problem of terrorism even further and complicated future collective counteraction to it.

Disunity in the Antiterrorist Coalition

Despite the fact that the United States certainly plays a leading role in the fight against the threat of nuclear terrorism, effective counteraction to a threat of this scale cannot be secured by unilateral American efforts alone. Practically all eight nuclear powers have reason to fear the possibility of nuclear materials falling into the hands of terrorists. There is a general understanding that the threat of nuclear terrorism comes from mainly the Greater Middle East, but in the future this could spread to parts of South East and East Asia, and also to Sub-Saharan Africa. It is more or less openly acknowledged that superterrorism is predominately associated with Islamic fundamentalists.

Presently the leading powers of the antiterrorist coalition hold differing views on the scale of the threat of international terrorism, its root causes, and the best methods for fighting against it. They also have different interests regarding the specific countries with which the threat of terrorism is most often associated.

The United States faces the widest spectrum of terrorist threats. This can be explained in part by its presence in regions far removed from its own territory, where it comes into conflict with the interests of local states and non-state actors. Not having the ability to counteract the leading superpower by traditional means, the resistance movements are relying on asymmetrical means, including terrorism.

In the Greater Middle East, the United States is the target of terrorists coming from all three fundamental sources – Shiite fundamentalism (Iran, Hezbollah), Sunni fundamentalism (al-Qaeda, the Taliban), and Arab nationalism (secular Palestinian groups). The U.S. is also increasingly drawn in on the side of Filipino government forces battling the Moro Islamic Liberation Front and has garnered hostility from warring factions in Somalia and Sudan.

For their part, European countries have historically encountered primarily Palestinian terrorism, whereas they had little contact with fundamentalist terrorism, up until the war in Iraq. Therefore, the European Union devotes extraordinary attention to relations with Palestine and to resolving the Arab-Israeli conflict, allegedly supposing that when this issue is resolved the impetus for terrorist activity against Western European countries will disappear.

As of now, Russia has had few collisions with Shiite fundamentalism, and during the Soviet era Arab nationalism was viewed as a valuable resource in the fight against a common enemy, the United States and the West in general. As the problem of radical Sunnism-Wahhabism grew for Russia, Shiite fundamentalism and Arab nationalism began to emerge as natural partners in confronting a common enemy.

Whereas India and China were indifferent to Arab nationalism, Sunni fundamentalism was a relatively more important problem, inasmuch as it supported Pakistani nationalism and Panturkism in western China.

In practical policies, this leads to differing priorities in relations with states that present a potential danger in terms of nuclear terrorism. Thus, Russia, India, and China do not see a serious danger in Iran, whereas the United States views it as the gravest security threat. Likewise, Russia, India, and recently the United States are highly anxious about the state of nuclear security in Pakistan and its susceptibility to Sunni fundamentalism (although this is not advertised in Washington), while the European Union and China appear politically indifferent to this issue.

The leading powers are also divided over the best methods for fighting terrorism. The United States, having an unprecedented war machine, relies largely on military means. But the European Union, which spends a much larger portion of its budget on social programs, places greater emphasis on alleviating poverty and regulating conflicts, first and foremost through political maneuvers

and by extending significant aid for post-conflict reconstruction. Although Russia has relatively limited resources of military and economic tools, it is nonetheless more inclined to rely on force than the European Union, foremost to suppress terrorism inside Russia and across post-Soviet space.

There are also discrepancies in the relative values placed on other instruments. For example, the United States favors methods of political pressure and the broad application of various types of sanctions. China, on the other hand, fully rejects pressure and sanctions on a declarative level, and only rarely and inconsistently employs them in practice. Russia and some European Union member states, meanwhile, largely prefer policies of preferential treatment and positive stimuli.

Many experts and states believe that terrorism is a consequence of deep-seated, fundamental problems. This would suggest that it is necessary to fight not so much with terrorism, as a symptom of social illness, as with its root causes. But even here there are some discrepancies. As has already been noted, the primary source of terror for many Europeans is the Arab-Israeli conflict. Other left-wing political forces believe that terrorism generally grows out of local conflicts, while the global network of al-Qaeda is an exception. Its emergence is seen as connected either with long-term disregard of Palestinian miseries, or with poverty, or with the United States' high level of involvement in the region's affairs.

American neo-conservatives believe that terrorist groups in the Greater Middle East are strengthening as a result of the insufficient democratization in the region, the long-term stagnation of many countries' socio-economic systems, as well as attempts to preserve medieval social structures. In order to combat these ills, it is seen as useful to shake up these countries, including (in the more extreme cases) by means of forcible democratization. And even though the misfortunes in Iraq greatly diminished the popularity of such ideas, the fight against "outposts of tyranny" around the world was declared by the Bush Administration as its core foreign policy doctrine.

Political interests also have a serious effect on both the policy of the leading players and on the place that problems of nuclear proliferation and the fight against terrorism hold amongst their national priorities. One would think that China should be anxious about Pakistan's nuclear arsenal, given the country's close relations with the Taliban and other Sunni groups, which potentially present a threat to stability in Xinjiang. However, Beijing pursues a policy of a balance of forces in South Asia, and it perceives "nuclear Pakistan" as a natural counterbalance to the regional superpower India. Therefore, the PRC has not just closed its eyes to Pakistan's nuclear program, but it has not prevented Chinese organizations from rendering nuclear assistance to Pakistan. Similarly, a

number of European states are participating in the operations in Afghanistan and Iraq not because the fight against terrorism and nonproliferation are in the foreground of their interests, but because this allows them to preserve close relations with the United States, to use this connection to strengthen their relative positions vis-à-vis other European Union member states, and in some cases to maintain American security commitments against Russia.

Russia and the United States

The greatest responsibility for preventing nuclear terrorism falls to the United States and Russia, which together still possess 95% of the world's arsenal of nuclear weapons and stockpiles of nuclear materials. However, despite the fact that both countries agree on the necessity of stepping up efforts to prevent nuclear terrorism, there are important areas of disagreement.

As for Russia's policy on this issue, the majority of experts concur that the basic factors of Russia's vulnerability to nuclear terrorism are, first of all, a high level of terrorist activity on its territory, and secondly, its relative proximity to a number of so-called "threshold" countries.[12] Russian experts believe that the so-called new nuclear states could become sources of possible leaks. In this sense, Moscow's particular discomfort due to the situation in Pakistan, for example, "is determined by the information consistently received [from this country], which, it seems, has become a 'transfer point' for secret nuclear and missile technologies." Furthermore, Russia is of the opinion that, given the traditional alliance between Pakistan and Washington, "there is much [America] can do in the sphere of strengthening the export control regime and intercepting the illegal transfer of WMD technology and delivery systems" in this country.[13] Russia's policies mostly center on the idea that counteractive measures toward the threat of nuclear materials leaking out and subsequently falling into the hands of terrorists ought to be directed first and foremost at developing countries.[14] And even given that threshold states and the several new nuclear powers receive priority attention, weak and dilapidated or unstable states that do not possess WMDs themselves but have transit pathways for these materials on their territory deserve particular attention. Significant portions of their territories are not controlled by government authorities and could serve as a shelter for various terrorist groups, including transnational superterrorist networks.

The United States shares Russia's anxiety about the possibility of nuclear materials leaking from these countries, and the use of their territories for the transit of these materials. That said, however, America's hierarchy of priorities in combating possible leaks of nuclear materials clearly differs from Russia's.

According to the appraisal of the U.S. Congressional Research Service, "the fundamental source of anxiety" regarding possible sources of nuclear material leakage is "Russia, which possesses a significant amount of fissile materials." This argument is based on the conditions of Russia's arsenal of tactical nuclear weapons, the security of which, according to American sources, "is maintained at a level lower than that of strategic armaments." American specialists also show particular anxiety vis-à-vis the presence of significant stockpiles of highly enriched uranium and weapons grade plutonium in Russia, the security of which, in the opinion of a number of experts, is also "inadequate."[15] This point of view can be traced to materials from the U.S. National Academy of Sciences, which emphasize the "high risk of fissile materials leaking from Russia," given the growth of internal threats to national security and the presence of a significant volume of stockpiles of nuclear materials, the storage conditions of which demand stricter accounting and control.[16] One of the leading U.S. specialists on the control and nonproliferation of nuclear weapons and materials, Senator Sam Nunn, has repeatedly declared that in terms of the possible leak of nuclear materials, "the greatest anxiety is summoned by the preservation of nuclear materials in Russia."[17]

That said, Pakistan as a potential source of nuclear material leakage takes a solid second place among U.S. priorities. A possible scenario for such a leak is the secret transfer of nuclear weapons or materials to terrorists by individual representatives of the Pakistani armed forces, or the new possibilities for access to such materials that could open up if President Pervez Musharraf were overthrown and an Islamist regime or general instability were to dominate the country.

It is interesting that "threshold" countries like Iran and North Korea take only third place among American priorities in this sphere. Next follows the threat of terrorists gaining access to the highly enriched uranium found in the more than 120 reactors in various countries that use it as fuel. Only a few independent American experts firmly declare that in Russia the prevention of potential leakage of nuclear materials is "clearly developing in the right direction," while at the same time "this deadly danger coming from other countries is growing."[18] In Moscow the question is often asked, whether the American political establishment is using the danger of nuclear terrorism as a pretext for strengthening political pressure on Russia by demonstrating its "inability" to secure "adequate" control over its own nuclear weapons and materials. Allegedly, the United States is interested in helping ensure the security of Russian nuclear arsenals, not just for the sake of preventing leaks, but also because this secures unique access to those arsenals. It is no accident that the United States insists

very firmly on receiving permission for highly intrusive access to Russian facilities and takes issue with providing assistance when the Russian side does not agree to permit access on the scale that America wants. The American side's reluctance to make concessions on access often leads to significant delays in security measures at the most sensitive and dangerous sites.

Iraq

The intervention against Iraq is an example of the exaggeration of a particular threat involving weapons of mass destruction and their potential acquisition by terrorists, as well as of the use of such a threat for strategic political purposes. Disinformation was actively used to suggest that the secular-nationalist Baathist regime in Baghdad was seeking to transfer WMDs to radical Islamist groups. In fact, the regime fought against such groups "by fire and by sword," including against the Ansar al-Islam group active in the country's Kurdish regions, to say nothing of the false allegations that Saddam Hussein's regime provided direct support to al-Qaeda, ranging from the construction of explosive devices to the forgery of documents.

At the same time, it should be noted that when the United States made a real threat of invasion at the end of 2002, Iraq renewed its collaboration with UN inspectors searching for its WMD potential. In contrast to its actions throughout the second half of the 1990s, Baghdad at this juncture granted the required documentation and allowed international inspectors to visit all facilities they desired with a short period of notification.

However, the decision of the United States and its allies to begin military intervention despite Iraq's actions in accordance the UN's resolutions seriously damaged the prospects for dealing with other potential violators of the nonproliferation regime. These countries saw that collaboration with the UN's intrusive inspections does not mean they will necessarily avoid invasion. Moreover, such inspections provide interventionist forces with extremely detailed information on the target state's defense. This eased the task of pursuing military operations with the utmost effectiveness and the fewest losses. Thus the international community's ability to coerce tenacious regimes has been diminished. Bogged down in Iraq, the United States does not have sufficient forces available for conducting similar interventions in other regions.

Saddam Hussein's regime prevented terrorist organizations of any variety from acting on Iraq's territory. After the invasion, the country became a new front in the fight against terrorism. In occupied Iraq, the continuation of terrorist activity is justified as resistance to the occupying forces and the collaborationist

administration. This fight attracts Islamist fighters from other countries, while helping al-Qaeda legitimize the global anti-American jihad it has unleashed.

The example of Iraq also gives evidence that American actions are in direct conflict with the fight against nuclear proliferation and terrorism.[19] The findings of post-invasion investigations into the lack of evidence of the presence of WMDs in Iraq seriously undermined international trust in the Bush administration's policy on nonproliferation and the fight against terrorism and called into question the competency of the American (and also British) intelligence and analytical communities on issues connected with WMDs.

Possible Sources

Among the primary resources of nuclear terrorism, the following threats should be emphasized:

- The acquisition and explosion of a nuclear munition from arsenals of nuclear powers;
- The acquisition of weapons-grade nuclear material (weapons-grade plutonium or highly enriched uranium) in quantities sufficient for assembling a nuclear explosive device;
- The acquisition of low enriched uranium and its subsequent enrichment to weapons-grade level by terrorist groups; and
- The acquisition of radioactive materials and the subsequent creation of a radiological weapon (a "dirty bomb").

Nuclear Warheads

One of the least likely scenarios is the theft of a nuclear warhead from the arsenals of the current nine nuclear powers: the United States, Russia, France, China, Great Britain, Israel, India, Pakistan or the DPRK.

In Russia, for example, warhead security is the task of a special branch of the armed forces, the 12th Main Directorate of the Ministry of Defense. During the entire period of debate over the security of Russia's nuclear weapons, there was only one episode, in 1996, when the former secretary of the Russian Security Council, Alexander Lebed, reported the loss of a few dozen "nuclear suitcases" that, according to Lebed, carried nuclear warheads created in the Soviet Union for subversive operations. From the very beginning, specialists treated Lebed's announcement with a certain amount of skepticism. Nuclear munitions are ellipsoids and could never fit inside a rectangular suitcase. Even assuming that it was

actually possible to achieve such a miniaturization of nuclear warheads, they would more likely be placed in a backpack or other container with an appropriate shape. It is no wonder that Lebed's statements did not subsequently prove to be true, and as far as is known, the issue is no longer considered during the course of the Russian-American nuclear dialogue.

It follows to note that Russia takes a serious approach to the strengthening of security measures for the storage of nuclear munitions. As early as 1991, the USSR had launched a unilateral initiative, according to which the bulk of its tactical nuclear warheads were transferred to centralized storage facilities, where it would be easier to ensure their safety. In the mid-1990s, the number of such facilities was reduced, making it possible to strengthen their security even further.

Despite the extremely sensitive nature of ensuring the security of its nuclear warheads, Russia decided to accept foreign assistance in this sphere. In particular, the United States, Great Britain, and France provided assistance in the securing of warheads during their transport. This was extremely timely from 1992 to 1996, when a few thousand nuclear munitions were being moved out of Ukraine, Kazakhstan, and Belarus and into Russia. The United States also provides assistance for the storage of nuclear warheads in the form of physical protection equipment.

The access of American and other foreign inspectors to the nuclear weapon storage facilities could obviously be viewed as contradictory to national security interests, and therefore this issue is subject to a difficult dialogue. However, it is known that in a number of cases, U.S. representatives were allowed into nuclear storage facilities.

Among other nations, the greatest dangers arise in Pakistan, the only Islamic country to possess nuclear weapons. The country's nuclear arsenal is not yet particularly large. Pakistan's total reserves of weapons-grade nuclear materials are sufficient, according to estimates, for the construction of 30 to 50 nuclear warheads. This significantly eases the task of accounting for and securing them. Moreover, so far as is known, during peaceful times Pakistan stores the nuclear and nonnuclear components of warheads separately, which would make theft of a finished nuclear weapon extremely complicated.[20] The greatest risk in Pakistan comes from representatives of the government, in the form of assistance to terrorist activity. Over the course of many years, an underground network headed by the father of the Pakistani atomic bomb, Abdul Qadeer Khan, sold nuclear technology and knowledge with impunity to a number of countries striving to obtain nuclear weapons. The fact that this man paid practically no penalty for actions that were incongruous with obligations that the country had voluntarily taken upon itself

gives evidence that the threat of bureaucrats joining up with the illegal export of nuclear materials and technology is far from exhausted in Pakistan.

In the longer term, access to Pakistani nuclear weapons could be gained as a result of political instability, when well-armed and well-financed terrorist groups could take advantage of a chaotic environment and overcome demoralized security forces at nuclear facilities. Another possibility is that, were the state to disintegrate, weapons could be sold by a bureaucrat striving to secure a life of ease abroad.

As in the case of Pakistan, the fact that the other nuclear powers (other than Russia and the United States) have relatively small arsenals eases the task of accounting for and securing them. However, new nuclear states probably do not have enough experience in this realm, making their nuclear infrastructures relatively more vulnerable. A number of countries, including China, India, and Pakistan, may have an insufficient level of technical equipment and physical protection systems in their nuclear storage facilities and other establishments.

In developed nuclear states, nuclear warheads are equipped with locking devices, preventing their unauthorized use. Thus, even if terrorists were to acquire such a nuclear weapon they probably could not detonate it without the release code. In this case, terrorists would only be able to extract the weapons-grade materials found within. Theoretically, these materials could subsequently be used to assemble a new weapon, but that would depend on the type of weapon dismantled and the nature of the materials located within. The reassembly of an implosive munition would require significant time and great technical knowledge. Furthermore, many believe that a munition can only be competently dismantled by the person who built it. Chances are that all or almost all of the nuclear warheads in the "developing" nuclear states (India, Pakistan) and possibly China, as well as old warheads located in developed nuclear powers, are not equipped with locking devices and, subsequently, do not have additional lines of defense in the case of their theft by terrorists. This increases the need for reliable security.

Weapons-Grade Materials

The prospects and sources of the theft of weapons-grade nuclear materials, and also the potential for their subsequent assembly by terrorist groups into nuclear explosive devices, is one of the most debated subjects in American academic literature. Specialists are divided on their estimates of the amount of materials necessary, the minimum degree of enrichment, whether HEU or plutonium is more vulnerable, and just how complicated it is to put together a weapon once the materials have been acquired in the requisite quantity.

Highly Enriched Uranium

Most of the researchers believe that HEU is more attractive to terrorists than plutonium. It can be used to create relatively low-tech "cannon-type" devices, whereas plutonium requires the creation of an implosive device, which is much more difficult to construct.

According to international classification, HEU that is considered adequate for creating a nuclear warhead has a concentration of uranium-235 no lower than 20%. Military weapons-grade HEU is considered to be that with a concentration of uranium-235 no lower than 90%. However, HEU with a lower concentration of uranium-235 could also be used to create a weapon. For example, during the creation of the Hiroshima bomb, around 60 kg of HEU were used, with an enrichment of up to 80%. Non-weapons-grade HEU was also used in the South African nuclear warheads that the country voluntarily destroyed at the beginning of the 1990s. According to estimates, around 55 kg of HEU with an enrichment of 80% were used in the creation of each of these munitions. A number of researchers believe that a nuclear explosive device could be put together using HEU with an even lower level of enrichment.[21]

Specialists differ in their opinions on how simple it is to put together a nuclear explosive device given sufficient quantities of weapons grade HEU. As the Nobel laureate Luis Alvarez emphasizes, "it seems that the majority of people do not realize that, given the presence of isolated HEU, creating a nuclear explosion is an extremely trivial matter… even a senior in high school could make a bomb in a short period of time."[22] In January 2002, the *New York Times* wrote that "a 100-pound piece [of enriched uranium], thrown onto another 100-pound piece from a height of around six feet could create an explosion with a yield of 5 to 10 kilotons."[23]

Of course, these are extreme estimates. The probability of an explosion during such an application of weapons-grade uranium is not 100%. Furthermore, the non-nuclear components of a cannon construction would need to be tested. To do this, a test site would be needed, which could be discovered by law enforcement authorities. Tests could be conducted on a site in a state where there is a lack of proper control from the central government or where the state structures are openly or tacitly collaborating with terrorists. It is also important to note that to make such an elementary explosion, metallic weapons grade uranium or HEU is required in large quantities (according to the version cited above in the *New York Times*, more than 80 kg).

Nonetheless, specialists believe that the fundamental barrier in the path of creating a cannon-type nuclear explosive device is the difficulty in acquiring

sufficient quantities of weapons-grade uranium. Tests may not even be required. The United States never tested the bomb used in Hiroshima in 1945. Given the presence of weapons-grade nuclear materials, a qualified specialist could assemble a weapon in relatively small accommodations. The RSA, for example, assembled its six nuclear warheads in a building outwardly camouflaged as a warehouse.[24]

According to estimates, there are more than 1,700 tons of military HEU accumulated in the world. Ten states possess this material: the five declared and three de-facto nuclear states, plus the RSA and North Korea. Some specialists doubt the presence of weapons-grade HEU in Israel and North Korea. The largest stockpiles of weapons grade HEU are in Russia and the United States.[25]

After the Soviet Union dissolved, the United States voiced concerns regarding the security of Russia's HEU stockpiles. The United States provided Russia with assistance directed at raising the effectiveness of the accounting, control, and physical protection of these materials.

Hundreds of millions of dollars are allocated for these goals annually, predominately from the U.S. Department of Energy. Moreover, an HEU-LEU deal was signed in 1997, according to which HEU extracted from dismantled Russian nuclear munitions is depleted to the level of low enriched uranium at facilities in Russia and then transported to the United States where, after additional processing, it is used as fuel for nuclear power plants (NPPs). According to the deal, the United States is obligated to purchase quantities of LEU equivalent to 500 tons of HEU. Russia expects to receive around $8 billion over the 20 years of this project's implementation.[26]

Since September 11, 2001, there has been an increase in the number of voices in the U.S. arguing that the assistance given to Russia in securing its stockpiles of HEU is going too slowly. It is noted that, in sum, security programs have been completed at Russian sites comprising 40% of stockpiles of the most sensitive nuclear materials. Examples of theft of HEU from Russian facilities are cited, although in the relevant incidents uranium of lower than weapons grade quality was actually stolen. According to research conducted by Stanford University, after the breakup of the USSR around 40 kg of weapons-grade HEU was stolen in the newly independent states, most of which was subsequently recovered. However, it has not been possible to assemble a complete picture of attempts to acquire HEU or other nuclear materials illegally.[27] These figures show that losses of weapons-grade HEU in the former Soviet Union, if they happened at all, were relatively small, and the quantity of materials that disappeared was lower than would be necessary for creating the simplest cannon-type nuclear explosive device.

Non-governmental experts in the United States have advanced a number of specific proposals to improve the situation. First, they recommend completing a new deal with Russia analogous to the HEU-LEU agreement, to purchase additional amounts of LEU from Russia. Second, they propose hastening work on the creation of the system of accounting, control, and physical protection. And finally, they propose requesting that Russia place 200 tons of HEU into storage at the Mayak facility in Ozersk, built with the help of the United States. Even though the Bush administration was listening to this advice, its actions were less ambitious. For example, it agreed to allocate funds for speeding up the process of depleting HEU, which would make it possible to deplete an additional 1.5 tons of HEU annually over the course of 10 years.

The United States also has problems securing its storehouses of weapons-grade materials. For example, simulated attacks at the TA-18 facility in Los Alamos showed that security authorities there were poorly prepared to put up adequate resistance.[28] In one case, weapons grade material was carried out of a facility inside a garden carriage. As a result, in 2000 the Department of Energy gave orders to transfer weapons grade materials from this facility to the nuclear test site in Nevada. The security of the Y-12 facility in Oak Ridge, Tennessee, was also criticized. This facility also had stores of refined HEU destined for nuclear warheads.

As for Pakistan, its small stockpiles of weapons-grade HEU make them easier to secure. There have been reports in the news media that the United States was providing assistance to Pakistan in improve the security of facilities housing nuclear materials. However, the inclination of Pakistani atomic scientists toward conducting illegal nuclear business makes the risk of leaks due to the unreliability of personnel still quite high.

The military arsenals of a limited number of nuclear states are not the only source of HEU. There is a particular danger in the stores of HEU for reactor fuel. Some types of reactors, first and foremost research and ship reactors, run on fresh fuel that is enriched higher than 90%. The spent fuel from these reactors also has a high concentration of uranium-235.

Research reactor fuel is viewed as especially dangerous, insofar as it is dispersed among facilities in dozens of countries, many of which are considered vulnerable to terrorist activity. By the IAEA's estimate, around 100 research reactors in the world use weapons-grade HEU as fuel, while another 20 use HEU enriched to a level higher than 50%. Seventeen countries have research reactors that were built with the help of the Soviet Union and/or Russia and run on HEU-fuel. These are generally states of the former Soviet Union and Soviet

alliance in Central and Eastern Europe, but also Egypt, Libya, China, North Korea, and Vietnam. The majority of these reactors have switched over to fuel with a lower degree of enrichment, but many of them still have fresh or spent fuel, with a concentration of uranium-235 at a level close to weapons grade.[29]

On May 26, 2004, the U.S. Secretary of Energy, Spencer Abraham, unveiled the Global Threat Reduction Initiative, in accordance with which all spent HEU fuel from Soviet-produced research reactors was to be returned to Russia by the end of 2005. Furthermore, all spent nuclear fuel from these reactors is to be returned to Russia by 2010. But even before the formal announcement of this initiative, the United States collaborated with Russia in securing the return of this type of fuel. For example, in 2002, during the implementation of the Vinca project, 48 kg of irradiated HEU fuel were delivered from Serbia to Russia. In 2003, another 14 kg of HEU fuel with an enrichment of around 80% were returned from Romania, and around 17 kg of irradiated HEU fuel with an enrichment of around 36% were returned from Bulgaria. In 2004, 88 fuel assemblies were transported from Libya to Russia, containing around 17 kg of HEU fuel enriched up to 80%. The United States allotted around $2 million for these operations.[30]

The United States itself is experiencing serious problems in identifying the reactor fuel it supplied earlier to dozens of countries. The scale of these supplies significantly exceeded those of the Soviet Union/Russia. As of 2003, the Secretary of Energy was able to determine the location of approximately half of the 5.2 tons of HEU subject to be returned to the United States. Moreover, attempts have not even been made to determine the whereabouts of another 12.3 tons of HEU that were supplied to other countries but are not included in the repatriation programs. Efforts to return this fuel are being undertaken within the framework of the initiative mentioned above. The U.S. government intends to secure the return of all spent fuel from American-built research reactors by the end of this decade.[31]

To create a nuclear explosive device on the basis of reactor fuel is technically more complicated than using weapons-grade HEU stolen from military or storage facilities. Reactor fuel exists in the form of oxide and therefore it must be transformed into a metal before it can be used in a weapon. This requires access to complex technology and expertise, and also the creation and use of an entire laboratory. As a result, if this activity is carried out in a civilized country, the risk of exposure grows. Of course, such laboratories could be created in countries with weak government oversight or where the state might provide some level of support. But the transportation of radioactive materials across state borders could

be intercepted by border and customs control, in particular through ubiquitous installation of radioactivity sensors at all border crossing points.

Plutonium

The majority of researchers agree that plutonium is less suited to terrorist purposes. Due to a number of physical peculiarities and its chemical activity, it is difficult to use plutonium in the production of even the simplest, cannon-type nuclear explosive device. However, several specialists insist that a cannon device based on plutonium is nonetheless capable of inflicting serious damage, destroying several blocks of a large city and irradiating a significant number of individuals through the inhalation of radioactive particles. That said, the probability that such a device would malfunction is fairly high.

Like HEU, plutonium can be used to create technically complex implosive devices. This demands access to a number of extremely rare and sophisticated technologies. Subsequently, this raises terrorists' demands for expertise and equipment, which in turn increases the risk of them being discovered before an attack can be carried out. Imploding charges, however, demand a smaller amount of nuclear materials: 8 kg of plutonium is probably sufficient. One such weapon was detonated over Nagasaki in 1945 and contained around 6 kg of this material. The effectiveness of imploding devices is also higher than the simpler cannon-type device. The complexity of such a warhead is illustrated by the fact that Iraq needed several years to gain the knowledge of how to create an effective implosive warhead. And this task would be even more difficult for terrorist groups, given that Iraq had the advantage of the resources of a large and rich state, and Baghdad relied on a large number of well-trained specialists and could work on the weapons program using good equipment and without the risk of discovery or destruction.

In the 1960s, the Lawrence Livermore National Laboratory in the United States conducted an experiment to estimate the possibility of the "homemade" assembly of a nuclear explosive device, assuming the availability of a sufficient amount of weapons-grade material. Two young physicists were hired who had doctorate degrees but did not have special knowledge in the field of nuclear physics. Relying on open sources of information they managed to assemble a working explosive device in just three years. Incidentally, from the very beginning, they renounced the idea of working on a simpler cannon-type device as intellectually unappealing. However, one must keep in mind that this experiment is not exactly a close simulation of the behavior of terrorists, as the young scientists were relying on the colossal resources of one of the United States'

largest national laboratories. Nor is it fully clear to what extent they were isolated from their colleagues during the course of the experiment. Nonetheless, this experiment produced an impressive and worrying result.

Experts believe that, as with HEU, there is a danger presented by both weapons-grade and reactor plutonium. It stands to reason that the greatest value for terrorists is weapons-grade plutonium. But as early as 1997, the U.S. government confirmed its prior announcement that reactor plutonium could be used as an explosive for a nuclear weapon. Reactor plutonium is theoretically applicable for creating a device that would be much less powerful, but still fully suitable for terrorist purposes. Currently, there are significant stockpiles of such material accumulated, totaling more than 1,800 tons. In comparison with HEU (1,700 tons), weapons-grade plutonium makes up only a small portion of this stockpile, around 150 tons. Nine countries hold such stores: the nuclear "eight" plus North Korea. The bulk of weapons-grade plutonium stores are located in Russia and the United States.[32] But most of the world's stockpile is made up of civilian plutonium, mostly contained in energy and research reactor fuel. Spent NPP fuel contains a certain quantity of plutonium. Technically, it can be separated and then used to create a nuclear weapon. This is most likely the path followed by the DPRK, secretly refining spent fuel from the reactor in Yongbyon in the early 1990s and then in the early 2000s. The problem is that, in contrast with HEU, plutonium is extremely complex to recycle. To recycle spent NPP fuel, it is necessary to separate it, and then either store it or reburn it in reactors. Due to its extremely long half-life, plutonium must be stored for a very long time, presenting serious challenges for nonproliferation and the prevention of its leakage to terrorists.

In other countries, besides the nine mentioned above, nuclear power on MOX-fuel is either not available or insignificant. As a result, civilian plutonium stockpiles continue to grow. Stockpiles of separated plutonium that would be of particular value to terrorists are located not only in the nuclear powers, but also in Germany, Japan, Belgium, and Switzerland. Stockpiles in Germany and Japan are as large as the stockpiles of weapons-grade plutonium in the United States, many times larger than the French, Chinese and British stockpiles, and still larger than the Israeli, Indian, Pakistani and North Korean stockpiles.

As with HEU, the United States expressed concerns regarding the security of stores of weapons-grade plutonium in Russia. However, up until the second half of the 1990s, due to internal political considerations Washington refused to proceed with cooperation in MOX-energy, agreeing instead to finance the construction of a storage facility for plutonium derived from nuclear warheads at the

Mayak complex in Russia. The United States spent around $400 million on this project. As of now, the facility has been built, and up to 50 tons of weapons-grade plutonium can be stored there.

At the end of the 1990s, U.S. policy regarding MOX-fuel changed, and in September 2000, Russia and the United States completed an agreement on recycling plutonium, in accordance with which Washington pledged to assist Moscow in liquidating 34 tons of plutonium that Moscow had declared superfluous for military purposes. For its part, the United States promised to recycle a similar amount of this material. However, this agreement was not ratified by the Federal Assembly, and in 2001 the Bush administration proposed conducting new negotiations.

It should be noted that the idea of burning a significant amount of plutonium as MOX-fuel is not a solution to the problem of how vulnerable stores of this material are to terrorists. Huge financial investments are needed to switch over to MOX-power – for the construction of both the fuel production facilities and the reactors that operate using it. By the most conservative estimates, billions of dollars and a lengthy period of time are needed to put a significant number of these facilities into operation and to initiate real reductions of plutonium stockpiles. Even worse, in the immediate future significant volumes of Western aid and Russia's own resources will be invested in an expensive ongoing program intended to solve a fairly narrow mission: the liquidation of a portion of reserves of weapons-grade plutonium that will be stored at a facility equipped with the most modern security measures (Mayak). In other words, huge resources will be spent on a task that is not the most urgent from the point of view of preventing nuclear terrorism. At the same time, crucial problems of HEU safety are yet to be resolved.

As for other nuclear powers, the situation with plutonium is most likely similar to the situation with HEU. The only difference is that North Korea has its own stockpiles of plutonium. This is a cause for concern on three accounts. First, the DPRK is the most totalitarian country in the world, currently in transition from a strict centralized economy to a more liberal one. However, its political system, based on a symbiosis of military brass and party bureaucrats, remains unreformed. And although many observers believe that the North Korean regime could survive in its present form for a long time still, there is no guarantee of the state's stability for the foreseeable future. This could lead to the weakening of control over stockpiles of plutonium and their acquisition by terrorists. Second, North Korea's behavior in the realm of nuclear missile technology proliferation has been very dangerous. Pyongyang closely collaborated with

Iran and Pakistan in this field and in many other cases supplied technology and expertise. The scope of this collaboration was so grand that, according to the press, a resort was built along the Iranian coast of the Caspian Sea specifically for the North Korean specialists who helped Iran develop military technology. Pakistan and Iran are Islamic countries, geographically located in the Greater Middle East – the zone of the greatest terrorist danger. This creates a potential channel for terrorists, amounting to a fundamental security threat for Russia and the United States. Third, Pyongyang itself has planned and committed terrorist acts in the past, in particular when it conducted operations to destroy South Korean civilian airplanes. Although Pyongyang has not committed such activities in the last few years, its former involvement in terrorist acts means that cadres prepared for these purposes could renew their activity. This would be possible either as a result of the isolation of the North Korean regime, due to its uncompromising attitude on nuclear weapons, or owing to the destabilization of the situation in the country and the integration of these cadres into the international terrorist network in search of subsistence.

Non-Weapons-Grade Nuclear Materials

A number of researchers believe that stockpiles of weapons-grade materials are sufficiently well protected that it would be relatively easier for terrorist groups to acquire non-weapons grade-materials – low enriched uranium or spent nuclear reactor fuel – and then independently either enrich the LEU to the level of HEU, or to separate plutonium from spent fuel. As has already been noted, this is the exact path that a few present nuclear powers followed. For example, the DPRK attempted to separate plutonium from spent nuclear fuel, and Pakistan enriched LEU to weapons-grade levels in centrifuges, a significant portion of the technology for which was received illegally, most likely from European countries. Separating plutonium from spent fuel requires radiochemical facilities. It would not be easy for terrorist groups to construct and operate such a facility independently. This would demand not just significant resources, but also great technical expertise. A radiochemical facility is a conspicuous site and would be relatively easy to detect through surveillance, even on the territory of a failed state or a country that supports terrorism. North Korea was forced to build a large underground facility in order to conceal its radiochemical production from the IAEA. But North Korea did not manage to conceal it completely. These facilities were highly energy-intensive, and supplying power lines were eventually discovered.

Incidentally, high-energy consumption is yet another practically insurmountable obstacle to attempts to create radiochemical facilities on the territory

of failed states. These states are quite poor and do not have large electrical generation capacities.

The same is true about centrifuges for enriching uranium. The centrifuges would be more difficult to detect if deployed in small numbers and small size in laboratories, but such a facility would take a very long time to produce a sufficient volume of HEU, which would make detection more likely. In 2004, it was discovered that South Korean scientists were illegally attempting to enrich uranium in laboratories. As South Korean officials maintained, the scientists were acting independently, hiding their experiment from the government, but the volume of HEU produced was meager. In other words, there have been precedents for hiding laboratory-scale uranium enrichment activities over a number of years. Chances are that terrorists could also do this after creating the appropriate laboratories in third countries. However, neither the South Korean nor Iranian experiments managed to derive weapons-grade HEU, to say nothing of the quantities necessary to create a nuclear explosive device.

Radioactive Materials

Of all the various threats under the heading "nuclear terrorism", the most probable in the foreseeable future is the use of surrogate means with the application of nuclear and radioactive materials, especially radioactive dispersing devices,[33] otherwise known as a "dirty bomb" (the dispersal of radioactive materials with the help of a conventional explosive). The likelihood of this threat stems from the fact that, given the relatively broad proliferation of radioactive sources, the corresponding materials are more readily accessible than other nuclear materials, to say nothing of a nuclear weapon. Though it would not lead to casualties even remotely comparable to those resulting from a low-yield nuclear explosion, the use of a "dirty bomb" is quite handy for achieving the aims specific to terrorism as a distinct mode of political or ideological violence, as it would spread maximum panic and lead to societal destabilization.

This point of view of many world experts coincides with the official position of the Russian Federation. As Russian deputy minister of foreign affairs, Vyacheslav Trubnikov, announced in April 2004 at the eleventh meeting of the Russian-American task force on terrorism, "of course the issue is not the use of a real nuclear bomb, but the threat of a 'dirty bomb' truly exists." Trubnikov named specifically the possibility of a dirty bomb with the use of fissile materials and isotopes (and also biological substances) as a more real threat of WMD terrorism.[34] Although the threat of nuclear terrorism as a whole is much wider, the

threat of terrorism using nuclear and radioactive materials in the near future is considered "the most probable."

Indeed, radioactive sources are so broadly proliferated that they can be found not just at the specific facilities where nuclear activity is conducted, but also, for example, in hospitals, offices, and some residential premises. Therefore, the fundamental difference from other potential sources of nuclear terrorism is that it is impossible to ensure their reliable security everywhere. Thus, it is impossible to prevent certain types of these materials from falling into the hands of terrorists.

However, radioactive sources that are located at peaceful facilities do not, as a rule, contain large quantities of radioactive materials. Therefore, to accumulate these materials on the scale necessary to create a dirty bomb, terrorists would have to steal them from dozens, hundreds, or even thousands of facilities. This would seriously increase the risk of the terrorist network being discovered while still preparing for an attack.

In preventing terrorist acts, efforts should thus be concentrated on securing facilities where there are significant stockpiles of radioactive materials. This includes reactors where highly radioactive spent nuclear fuel is stored, as well as storage bases of spent fuel from ship reactors, and storehouses of other radioactive waste. A number of these facilities are already highly protected, particularly NPPs and storage areas for naval radioactive waste.

It should be emphasized that in order to counteract radiological terrorism, a comprehensive approach is particularly important. Human intelligence is extremely important in order to gain the information needed to suppress attempts at creating a dirty bomb. Special attention should be devoted to intercepting materials intended for terrorist purposes. This is made easier by the availability of radioactivity sensors, which make it possible to detect material when it is being transferred from the place of theft to the place of storage, as well as from the storage facility to the location of the planned attack. These sensors have already been set up at Russia's main border crossings, as well as in a number of other countries.

Nuclear terrorism is presently not among the most probable means of international extremist organizations with megalomanic motives. It is hindered by a whole series of factors: the difficulty of gaining access to nuclear warheads and weapons-grade fissile materials; the technical complexities of assembling nuclear weapons; the motivational self-restraints of some terrorist groups; and so on.

But a series of current tendencies shows that the situation could change. The natural processes of globalization and scientific and technological progress make

nuclear technology more accessible, promoting proliferation. Many nuclear experts were made jobless by the end of the Cold War, and the reduction of nuclear forces led to the accumulation of a growing number of weapons and of a large volume of weapon-grade materials in storages. Globalization facilitates both the creation of global terrorist networks and the cross-border expansion of terrorist groups that used to be local. The nuclear black market is growing, drawing in corrupt high-standing officials in a number of countries. As a result, terrorists can gain access to state arsenals and technologies. In failed states, they can receive a safe haven for developing their own WMD arsenals and bringing them up to the level needed for terrorist purposes. The destabilization of a number of new and potential nuclear states also cannot be ruled out, which could lead to a finished nuclear weapon falling into the hands of terrorists.

Judging by cost effectiveness, weapon-grade HEU is the most lucrative target for terrorists. Stores of HEU are abundant and, in a number of cases, insufficiently protected. It is simplest of all, technically speaking, to create the most primitive cannon-type nuclear explosive device out of weapon-grade uranium. According to a number of experts, such a device could even be set off without a detonator. But for such a scenario to occur, terrorists would have to have pure, metallic weapons-grade uranium, which is very strictly guarded. And they would have to get a fairly large quantity of this material. It stands to reason that a nuclear warhead taken from the arsenals of a nuclear state is capable of producing the greatest damage. However, these are among a nation's most highly guarded assets, and these are thus the most difficult for terrorists to gain access to. Plutonium is the most effective material for making an implosive weapon, but manufacturing such a device involves much greater technical complexities. Moreover, weapon-grade plutonium is more easily accounted for and protected, inasmuch as there are significantly fewer stores of it than of HEU.

On the other hand, stockpiles of LEU are less secure, and it is thus easier to get hold of than weapon-grade uranium. But in order to enrich it, terrorist groups would have to spend a lot of money over a relatively long period of time and use bulky and conspicuous equipment. This would create a high probability of timely detection and suppression of such activity. The same is true about civilian plutonium, which is stored in large quantities (about as large as the quantities of weapon-grade uranium) and is less stringently protected than military plutonium or HEU, but which would require an expensive, technologically complicated and dangerous electrochemical process to separate it from irradiated nuclear fuel and use for manufacturing an explosive device.

A dirty bomb is, without question, the most likely type of nuclear terrorism in the near future. It is virtually impossible to secure reliably all sources of radioactive materials, as these could total several million units throughout the world. Therefore, they are the easiest for terrorists to gain access to. But in terms of the scale of immediate fatalities caused, a dirty bomb is considerably less effective than many conventional means, to say nothing of a nuclear explosive device. Of course, the scale of damage to economic and social activity could turn out to be extremely great, but this would require a significant amount of radioactive materials and their effective dispersal. Moreover, the wide availability of radioactivity sensors eases the task of discovering a dirty bomb while it is being transported and various methods and means of radioactive clean-up are available (formerly developed for civil defense in the aftermath of a nuclear war).

This picture changes substantially if terrorist activity is supported by state actors in a few countries, especially during a period of instability in nuclear or near-nuclear powers. This would be the easiest situation of all for terrorists to acquire what they need, including finished nuclear weapons. In any scenario involving LEU or civilian plutonium, the main role could be played by a failed state or a rogue state, which might provide the territory and infrastructure needed for the creation of a uranium enrichment facility or nuclear fuel reprocessing.

Overcoming discord among the leading powers is of utmost significance. Some efforts on coordination are being made. A dialogue is ongoing between the secret services of various countries, and attempts are being made to coordinate activity within various organizations and informal groups working on key documents to refine the international legal base for the fight against terrorism. International cooperation is developing in the field of military measures for preventing nuclear proliferation and depriving terrorists of any safe harbor where they could prepare terrorist attacks. However, these all require further development and enhancement – much greater than achieved so far.

For instance, up to now it has been impossible to agree on priorities for preventing nuclear materials from falling into the hands of terrorists. Thus, little is being done within, for example, the framework of the G8 Global Partnership to increase the security of highly enriched uranium, the material that is most attractive to terrorists. Instead, priority is given to different issues. An agreement on military plutonium recycling is most welcome, but even if achieved it will channel significant resources to resolving a problem that, though important, is not as dangerous as the problem of HEU stockpiles.

Even where priorities are specified, they are addressed extremely slowly. This, in particular, relates to the return of highly enriched fuel for research reactors to

the country of production. The United States made an important decision to complete this process by the end of the decade, but the process of locating American-supplied fuel is dragging on.

Thus, the measures being taken to prevent nuclear terrorism are so far insufficient. Given the rapid growth of a range of negative factors – the development of the nuclear black market, the globalization of terrorist activities, the destabilization of a series of nuclear states, and further nuclear proliferation – it cannot be ruled out that these measures are already too late. If this is the case, then terrorists are gradually winning the race for gaining access to nuclear weapons, and a serious thought should be given to whether the world is ready to react to the horrifying consequences of a terrorist nuclear explosion.

The International Convention for the Suppression of Acts of Nuclear Terrorism

A positive step in strengthening the international legal framework for preventing nuclear terrorism was the passage by the UN General Assembly of the International Convention for the Suppression of Acts of Nuclear Terrorism (Nuclear Terrorism Convention). This document was approved by consensus on April 13, 2005 and was open for signing between September 14, 2005 and December 31, 2006. In order to take effect, it needed to be ratified by 22 states.

The convention's passage was preceded by long negotiations within a special committee, which approved the General Assembly's resolution as early as December 1996. In 1997, Russia introduced a draft of the Nuclear Terrorism Convention into the UN, on the basis of which the final text was agreed. The Convention was the first document of this kind initiated by Russia to be accepted by the UN.

This document was aimed at preventing acts of terrorists with the use of weapons and materials of mass destruction. In accordance with Article 2 of the document, "any person commits an offense… if that person unlawfully and intentionally a) possesses radioactive material or makes or possesses a device: i) with the intent to cause death or serious bodily injury…"[35]

Thus, it is considered a crime not just to commit a terrorist act but also to possess radioactive materials with the intention of using them for illegal purposes. The Convention broadens the international obligation to extradite individuals suspected of nuclear terrorism. For example, Article 9 gives member states the right to implement extraterritorial jurisdiction on individuals if the "offense

is committed in an attempt to impel that State to do or abstain from doing any act."[36] Thereby, it is recognized that states have the right to demand the punishment or extradition of foreign citizens that have committed offenses against their interests on the territory of a different state. This makes the pursuit of terrorists substantially easier.

Moreover, signatories agree to make changes to their current agreements on the extradition of criminals, eliminating discrepancies between prior agreements and the provisions of the Convention (Article 13).

According to Article 15, "none of the offenses set forth in article 2 shall be regarded, for the purposes of extradition or mutual legal assistance, as a political crime… Accordingly, a request for extradition… based on such an offense cannot be refused on the sole ground that it concerns a political offense." This provision prohibits the justification of international nuclear terrorism by terrorists' political persuasions and makes an important contribution to counteracting the practice of double standards, under which one and the same act can be viewed as legitimate when the suspects adhere to the same ideology as the state harboring them, but criminal when the terrorists' views contradict that state's policy.

Especially significant is the requirement of Article 11 that, in the case of non-extradition, the suspect is immediately subject to criminal prosecution by the state where the alleged offender is located. Thus, the appropriate authorities in this state should act in the same manner as they would with any other weighty crime, regardless of whether the crime was committed on its territory or not.

Moreover, the Convention contains a list of specific cooperative measures to be undertaken by signatories in the fight against nuclear terrorism. It also requires that the states' governments provide information on their organizations that are responsible for exchanging relevant information to all of the Convention's other participants, as well as to the Secretary General of the UN (Article 8). The Convention binds them to undertake all efforts to strengthen the protection of radioactive materials in cooperation with the IAEA (Article 9).

Article 18 of the Convention regulates the handling of nuclear materials and devices captured by states as a result of interdiction of nuclear terrorism. These materials and devices should be neutralized and placed under IAEA safeguards, and they should be handled according to the recommendations and standards of the IAEA. Upon the investigation's completion, they are to be returned to the state that owns them or to the country whose citizens committed or attempted to commit the crime.

However, the Convention is limited in its application. For example, in accordance with Article 3, it "shall not apply in cases where the offense is commit-

ted within a single State, the alleged offender and the victims are nationals of that State, [and] the alleged offender is found in the territory of that State."[37] In other words, the Convention's provisions do not cover acts of "internal" terrorism. It encompasses only those terrorist acts that are transnational in nature. Such an exemption opens the door for "internal terrorism" to be legitimized: according to this document, the use of nuclear materials or devices within the borders of the state they are being directed against is not the object of the Convention.

Furthermore, the Convention only extends to the use of nuclear materials and devices unauthorized by official powers. According to Article 4, the document does not cover "the activities undertaken by military forces of a State in the exercise of their official duties." This exemption allows the Convention's critics to maintain that the Convention is unjust. Although it freezes the use of nuclear materials by sub-state groups, for example rebellious organizations, it does not contain any such prohibition against governments using the same materials for punitive purposes.

Article 16's provision *de facto* nullifies Article 15, which prohibits refusal to extradite nuclear terrorism suspects on the basis that the individuals acted for political reasons. In accordance with Article 16, "nothing in this Convention shall be interpreted as imposing an obligation to extradite... if the requested State Party has substantial grounds for believing that the request for extradition… or for mutual legal assistance… has been made for the purposes of prosecuting or punishing a person on account of that person's race, religion, nationality, ethnic origin, or political opinion or that compliance with the request would cause prejudice to that person's position for any of these reasons." Insofar as the understanding of "substantial grounds" is not defined in the text, this article allows the states to refuse extradition on the basis of their supposed "substantial grounds," believing that the request for extradition was made due to the suspect's political opinions.

Notes:

[1] According to some data, after Director of the CIA George Tenet's special briefing on al-Qaeda's nuclear ambitions, carried out in October 2002, President George Bush made a statement in favor of his team viewing the threat of nuclear terrorism as a priority in the issue of strengthening national security in comparison with other threats. For more, see: Gellman, B. Fears Prompt U.S. to Beef Up Nuclear Terror Detection. *The Washington Post.* 3 Mar. 2002.

[2] For more on the general peculiarities of superterrorism, see, for example: Stepanova, E. War and Peace Building. *The Washington Quarterly: On the Third Anniversary of 9/11.* 27.4 (Autumn 2004): 128–129 ff.

[3] For more, see: Hoffman, B. Holy Terror: The Implications of Terrorism Motivated by a Religious Imperative. Santa Monica, Calif.: RAND, 1993. (RAND Doc.; P-7834).

[4] Parachini, J. Putting WMD Terrorism into Perspective. *The Washington Quarterly.* 26.4 (Autumn 2003): 39.

[5] United States CIA. Terrorist CBRN: Materials and Effects. May 2003. <http://www.cia.gov/cia/reports/terrorist_cbrn/terrorist_CBRN.htm>.

[6] FBIS: Report Views Bin Laden's Operations, Counter Terrorism Efforts. FBIS Doc. ID: GMP20010214000205, 26 Jan. 2001.

[7] From the moderate number of proven cases of WMD application, a rare case of their use by organizations involved in local arms conflict was when, in 1990, the Liberation Tigers of Tamil Eelam used chloride in the course of attacking a government forces base in the north of Sri Lanka.

[8] See, for example: Bunn, M. Preventing Nuclear Terrorism: A Progress Update. Project on Managing the Atom. Belfer Center for Science and Intern. Affairs, JFK School of Government, Harvard Univ. Cambridge, 22 Oct. 2003. 4; Allison G. "How to Stop Nuclear Terror." *Foreign Affairs.* Jan.–Feb. 2004: 64–74, etc.

[9] It is interesting that the engineer was detained accidentally. There were no traces of the loss of enriched uranium found at the facility. However, the facility began losing electric bulbs that were being unscrewed by extremely low-paid workers with the goal of selling them at Moscow markets. Therefore, employees of the local militia were checking the baggage of all facility employees that were traveling to Moscow.

[10] Center for Nonproliferation Studies. Confirmed Proliferation – Significant Incidents of Fissile Material Trafficking in the Newly Independent States (NIS), 1991–2001. CNS Reports. 30 Nov. 2001.

[11] The "Greater Middle East" is a new term that unites the traditional Middle Eastern countries of North Africa – members of the league of Arabian states, Iran, Afghanistan, and Pakistan. By some characteristics, this region could also include the predominately Kurdish regions of Eastern Turkey and a portion of formerly Soviet central Asia and Transcaucasia.

[12] Kalyadin, A. Rol' silovogo prinuzhdeniya v predotvrashchenii rasprostraneniya oruzhiya massovogo unichtozheniya [The Role of Forceful Coercion in Preventing the Proliferation of Weapons of Mass Destruction]. *Yader. kontrol'.* 9.3 (2003): 50.

[13] Evstafiev, G. Nerasprostraneniye OMU: nekotorye problemy i riski [WMD Nonproliferation: A Few Problems and Risks]. *Yader. kontrol'.* 10.1 (2004): 70.

[14] Ibid., 71.

[15] Medalia, J. Nuclear Terrorism: A Brief Review of Threats and Responses. Congressional Research Service (CRS) Report RL 3259522. Washington, DC: Library of Congress, Sept. 2004. i, 2 ff... See also: Woolf, A. Nuclear Weapons in Russia: Safety, Security, and Control Issues. CRS Report RL32202. Washington, DC: Library of Congress, 15 Aug. 2003.

[16] Committee on Science and Technology for Countering Terrorism. Making the Nation Safer: The Role of Science and Technology in Countering Terrorism. National Research Council Report. Washington, DC: National Academics Press, 2002. p. 44.

[17] See, for example, Sam Nunn's BBC interview, Nuclear Terror: Matter of Time. BBC News. 21 July 2004.

[18] Bunn, M. Op. cit., p. 1–2.

[19] Norton-Taylor, R. Axis of Failure. *The Guardian.* 3 Nov. 2004.

[20] Albright, David. Securing Pakistan's Nuclear Weapons Complex. Paper for 42nd Strategy for Peace Conference, Oct. 25-27, 2001, Warrenton, Virginia.

[21] Ferguson, Ch. D., Potter, W. C. Improvised Nuclear Devices and Nuclear Terrorism. Unpublished paper. 2. See also: Ferguson, Ch. D., Potter, W. C., Sands, A., Spector, L. S., and Wheling, F. L. The Four Faces of Nuclear Terrorism. Washington, DC: Nuclear Threat Initiative, 2004.

[22] Alvarez, L. W. Adventures of a Physicist. [S. l.]: Basic Books, 1988. p. 125.

[23] Wald, M. L. Suicidal Nuclear Threat Is Seen at Weapons Plants. *New York Times.* 23 Jan. 2002.

[24] Albright, D. South Africa and the Affordable Bomb. *Bulletin. of the Atomic Scientists.* Jul.–Aug. 1994.

[25] Albright, D., Kramer, K. Fissile Material: Stockpiles Still Growing. *Bulletin of the Atomic Scientists.* 60.6 (Nov.–Dec. 2004): p. 14.

[26] Nuclear Threat Initiative. Reducing Excess Stockpiles: The U.S.-Russia Highly Enriched Uranium Purchase Agreement. Washington, D.C., 2004.

[27] Trei, L. Database Exposes Threat from 'Lost' Nuclear Material. *Stanford Report.* 6 Mar. 2002. <http://news-service.stanford.edu/news/march6/database-36.html>.

[28] Kelle, A., Schaper, A. Terrorism Using Biological and Chemical Weapons: A Critical Analysis of Risks after 11 September 2001. [S. l.]: Frankfurt Peace Research Inst., 2002. 20. (PRIF Research Papers; # 64).

[29] World Nuclear Association. Research Reactors. [S. l.], Aug. 2003.

[30] Abraham, Spencer, Secretary of Energy. Speech at the International Atomic Energy Agency. Vienna, Austria: 26 May 2004.

[31] U.S. Department of Energy, Office of Inspector General, Office of Audit Services. Recovery of Highly Enriched Uranium Provided to Foreign Countries. DOE/IG-0638. Feb. 2004.

[32] Albright, D., Kramer, K. Op. cit., p. 14.

[33] Such devices could be used even without explosive matter (for example, by directly placing the source of radiation in buildings, ventilating systems, etc.).

[34] *Rosbiznes Consulting*. 2 Apr. 2004.

[35] The International Convention for the Suppression of Acts of Nuclear Terrorism. Provision to Resolution 59/290 accepted by the General Assembly. Fifty-ninth session. Point 148 on the agenda. General Assembly, 15 Apr. 2005. A/Res/59/290.

[36] Ibid.

[37] Ibid.