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Terrorist acts in the United States started the era of super-terrorism. So far the terrorists have not resorted to WMD components – to nuclear, biological and chemical weapons.

Does it mean that the international terrorism will not use these weapons in the future?

International Terrorists – Who and Why? There are more than 500 terrorist groups in the world; many of them have international character.

Terrorist groups are numerous in the states with grave ethnic and religious problems (Algeria, France, Sudan, Israel, Lebanon, Egypt, Tajikistan, Georgia) and hotbeds of separatism (ETA in Spain, IRA in the UK, Kurdish Labor Party in Turkey, Syria, and Iraq, Tamil Tigers in Sri Lanka, Chechens in Russia, etc.).

However, terrorism and separatism are not synonyms. Terrorist organizations may also take the form of extremist political movements (in Italy, Greece, Peru, Brazil, Argentina, etc.), or religious sects (Japan, the USA, Ukraine, etc.). It is extremely dangerous when terrorist groups merge with organized crime (as it happens in Colombia or Chechnya), or when they become transnational (the Kurdish Labor Party, Aum Shinri Kyo, Afghanistan-based International Islamic Front for Jihad against the Jews and the Crusaders of Osama bin Laden, etc.).

The first debate on the possibility of WMD-terrorism began in the 1960s: the wave of terrorism made people think about the consequences of terrorist acts that might occur if nuclear weapons became available to unbalanced individuals. The wave of terrorism was growing and rolling back, hotbeds of terrorism emerged in different regions, but the discussion on WMD-terrorism did not stop. The problem became even more urgent in the 1990s: the collapse of the Soviet Union in 1991 weakened the control of WMD arsenal; development of the Internet enabled everybody to have access to diverse scientific and technological information concerning WMD

production; the unprecedented attempt of WMD use occurred in 1995 (sarin attack in the Tokyo subway organized by Aum Shinri Kyo).

Meanwhile, there has been no large-scale use of WMD, except the Tokyo subway incident, albeit there are many known facts of employment of highly toxic chemical agents for terrorist purposes.

It is difficult for terrorist groups to obtain access to WMD components and related technologies, but this task may be accomplished in principle.

In the late 1990s it became obvious that terrorist organizations shifted their attention from traditional limited terrorism to the procurement of WMD components. In fact, one could speak about the birth of super-terrorism.

Major motivation of super-terrorists is their hatred to political regimes and their leaders (leftist and rightist extremist terrorism), although they change their priorities in the direction of ethnic, nationalistic and religious (apocalyptic) terrorism. Experts assume that religious terrorism will reach its culminating point by 2020-2030.

Chemical, Biological or Nuclear? Chemical weapons are the most likely tools of terrorists because chemical agents:

are extremely toxic and quite small amount of substance is lethal (it is 40 times more efficient to use CW than conventional explosives). It is difficult to identify specific chemical agent used and the source of the attack;

some agents have particular characteristics making them applicable for combat use (volatility, quick absorption through the skin, etc.). Chemical weapons cannot be detected by traditional antiterrorist sensors;

certain agents may be employed with the help of specialized technologies easily transformed for terrorist purposes;

some agents are cheap and easy to produce. Chemical agents may be manufactured by a small group of specialists, even by one skilled chemist in the small laboratory and disseminated via the vacuum fan. Methods of synthesis have repeatedly been published. CW may be used secretly, in doses and may affect the body for a preset period of time. Neither population nor authorities expect the use of CW and, probably, will detect the attack when it is too late. CW may inflict thousands of casualties if they are used against a crowd of people in the closed medium. It is particularly effective to use binary CW;

some agents are efficient for provoking panic and fear.

As far as biological weapons are concerned, the possibility of their employment is less probable than the use of CW, but is more likely than the recourse to nuclear and radiological weapons for terrorist purposes.

However, BW are quite easy to acquire and use and they are cheap. Besides, BW are good for secret use and may have selective effect.

The most probable is the use of such germs, as typhoid, paratyphoid, botulism toxins, and others, in the buildings equipped with air-conditioning systems and ventilation. The viruses may also be applied to fresh water tanks, food, and cosmetics.

To assess the possibility of nuclear terrorism, let us remember the attempts of nuclear terrorism or declarations of the intention to undertake such acts.

In 1975, Union Oil Co. of California received a letter with the demand for \$100,000. Terrorists threatened to detonate the nuclear explosive device hidden at one of the plants.

In the 1980s, separatists from Puerto Rico threatened to conduct terrorist acts against nuclear facilities on the US territory.

In 1985, the Armenian Scientific Group (a US terrorist group) argued that it would destroy large cities of Turkey with the help of three nuclear explosive devices allegedly available to the terrorists.

In 1994, a criminal group threatened to blow up the Ignalinskaya NPP in response to the court decision in Lithuania, which envisaged death sentence for one of its leaders (the explosive device was not found).

In 1995, during the wave of industrial protests in France the protesters put salt in the second cooler of the third reactor at an NPP.

In 1995, Bosnian Serbs leader Radovan Karadzic intended to acquire low-yield nuclear explosive device.

In 1995, it turned out that Aum Shinri Kyo was planning to develop a nuclear explosive device from uranium, which it intended to extract in Australia, and to conduct the acts of nuclear terrorism.

The aforementioned examples and many other instances demonstrate that there is no significant evidence of preparations for nuclear terrorism. Our analysis enables us to make the following conclusions concerning the nuclear terrorism challenges in the near future.

It is hardly possible that any terrorist group will manage to develop a nuclear explosive device on its own or with the help of recruited nuclear scientists. At the same time, experts note that there is a plutonium problem that will be even more topical in the early 21<sup>st</sup> century. By 2010 civilian reactors will fabricate about 450-500 tons of plutonium. This amount exceeds demands of the states. In this context, the risk of creating an indigenous nuclear explosive device from reactor plutonium cannot be ruled out.

Unauthorized access of terrorist groups to nuclear munitions is also quite unlikely. At the same time, access to and theft of nuclear munitions during transportation or dismantlement cannot be precluded. Nonetheless, protective mechanisms of the munitions help to avoid their unauthorized detonation.

Terrorist attacks are normally aimed at achieving immediate dramatic effect. The easiest way to attain it is to use radioactive materials. For instance, an attack by a light-armed group of terrorists against the nuclear plant or the statement concerning the use of nuclear weapons and materials may not inflict realistic damage, but will cause hysteria and fear. Hence, the number of declarations pertaining to the intention to seize nuclear facilities and the number of corresponding attempts (even if they doomed to failure) will probably increase.

One should not rule out the possibility of well-prepared terrorist acts targeted against NPPs. One of the worst-case scenarios would be another Chernobyl, which damaged health and caused psychological traumas to thousands of people, contaminated vast agricultural areas, led to the loss of energy source and resulted in high expenditure to eliminate the consequences of the emergency. Even if it is possible to prevent radioactive fallout, long break in the work of reactor may lead to large economic and sociopolitical losses.

It is quite probable that terrorist organizations may develop and use radiological weapons, using radioactive waste.

#### Super-Terrorism: Is There Any Protection?

The efforts to combat nuclear terrorism are diverse. An important contribution would be the activities of law-enforcement and secret services aimed at neutralizing terrorist groups. A set of measures should be taken in order to limit the damage and to eliminate the consequences of nuclear accidents. However, the key element of containing and preventing armed attacks against nuclear facilities is their system of physical protection.

Let us look at the security system of the NPP. The first step is to define the roles and responsibilities of agencies concerned.

The requirements to the system of physical protection are developed after analyzing the parameters of potential threat. The so called model of basic threat is elaborated after assessment of terrorist, criminal and violent antinuclear activities within the country and abroad and evaluates such parameters, as the size of the terrorist group, used weapons and equipment, tactics, etc. The model is regularly reviewed. For instance, after the penetration of the truck on the territory of Three Mile Island in the United States (March 1993), the Nuclear Regulatory Commission decided to provide for the possibility of penetration of transport means armed with explosives on the territory of NPPs. Appropriate measures were taken at all US NPPs.

The system of physical protection of nuclear facilities is based on the assumption that there is relative order and there are no hostilities. For instance, the attack of Chechen guerrillas against Budenovsk (1995) goes far beyond the framework of the basic model. The responsibility for the prevention of such threats is a prerogative of law-enforcement agencies and not NPPs.

There is no danger in unauthorized access to research reactors with the capacity of less than 2 MW. The situation with more powerful reactors depend on the type and design of each particular plant.

The next step in designing the protection systems of the NPPs will be the identification of its vital elements and possible ways of their destruction. The list of critical equipment is drawn in close interaction with the NPP employees and experts from design bureaus. It normally includes the spent fuel storage facility and such components of the reactor, as the central control compartment, main and reserve cooling systems (pumps, pipes), power supply units (cables, diesel generators, switches). This stage provides for the integration of technical safety aspects and physical protection techniques. The assessments detect possible routes of terrorist movements and timing. Time is decisive. The design of the security system, the characteristics of devices, skills of personnel should enable the staff and security agents to contain the terrorists before the arrival of reinforcement units.

Real protection of NPPs is ensured by the system of engineer barriers, technical means and security personnel. The task of the technical systems protecting the perimeter of the NPPs (including the double fencing, lights, sensors and CCTV) is to provide full and timely information on attack. This information is used to organize the defense and to call for reinforcement. Decisive factors are activities and skills of the guard, its equipment. Without active resistance of the guard, terrorists may need 1.5 minute to penetrate the critical zones of the reactor and to destroy the equipment with compact explosive devices and grenade launchers (like RPG-7).

Much attention should be paid to the problem of neutralizing the possible assistance to the terrorists on the part of employees. Routine measures include the checks of loyalty, drug and alcohol control, protection of information. There must be a strict control of access to the territory of the NPP and its important zones. Upon entering the station, all employees should pass the monitors (similar to the airport equipment) and be screened for weapons and explosives.

It is more difficult to organize the protection of the NPP than to ensure the security of strategic materials at the nuclear fuel cycle facilities. This is accounted by the fact that it takes less time to destroy the critical elements of the reactor than to seize and steal fissile material. Moreover, penetration of terrorists to the reactor is enough for the success of the operation, whereas if fissile materials are stolen, one may chase the criminals and return the material.

Is There a Threat for Russia?

In the 1990s, Russian doctrines and major conceptual documents regarded nuclear terrorism, as one of the major threats to national security.

"[...] There is a broadening range of threats related to international terrorism, including possible use of nuclear weapons and other WMD."

The problem of nuclear terrorism (or WMD-terrorism), along with the issue of illicit nuclear trafficking, helps to consolidate practical efforts of Russia and the West (Russia and the United States in particular), forces them to work together to the benefit of common interests.

In 1992, the Russian counterintelligence service warned that the threat of nuclear blackmail with respect to nuclear power plants was more than movie fantasies. Officers of the Russian secret service published an article in the state-owned newspaper and informed the public on the developments of 1990 and 1992, when directors of the Kursk and the Smolensk NPP received letters with a threat to blow up or to seize the NPP. In 1993, one of the leaders of the Chechen militants – Shamil Basayev – said that he had been offered to buy a nuclear explosive device for \$1.5 million. In October 1994, Moscow Mayor Yury Luzhkov delivered a speech at the special session of the Moscow Government devoted to prevention of terrorist threats at nuclear facilities in the city. He admitted that he was concerned about possible emergencies at nuclear facilities and the possibility of their seizure.

In 1995, the Chechen militants deployed a container with radioactive isotope of cesium-137 in Izmailovsky Park in Moscow. The material was not extremely dangerous and was supposed to have psychological, rather than any military effect. In the same year experts, close to the secret service, reported that there was a dangerous link between ethnic terrorist groups and organized crime groups in Russia, on the one hand, and international criminal communities, on the other. For instance, Russian criminals established ties with Italian, Colombian, and Arab counterparts. The channels for arms and drug trafficking connected Gorny Badakhshan (Tajikistan), Abkhazia (Georgia), Chechnya and Ingushetia (Russia) with Colombia, Antigua, Pakistan, Yemen, Laos, and Estonia. Some presumed that these well-established channels can be used for transfer of WMD for criminal and terrorist purposes.

In March 1996, M. Barsukov, then Director of the FSB, in his interview with the Moscow News argued that attempts of seizure of NPPs, other hazardous facilities, CW storage sites and nuclear weapons themselves were "quite possible".

In 1997, during the Tokyo trial one of the leaders of Aum Shinri Kyo maintained that the sect had acquired a secret technology for sarin production in Russia with support of Oleg Lobov, then Secretary of the Russian Security Council. Obviously, the photos of Oleg Lobov and the leader of the Aum Shinri Kyo were published, but the law-enforcement agencies involved in the investigation in Moscow did not confirm this information.

In spring 1997 the FSB prevented an attempt of diversion at the NPP. The President's Office in Moscow received a phone call with a warning to seize the NPP. According to the FSB, intentions of this terrorist were quite serious and the threat was more than realistic. He was arrested and it was a victory of the FSB, as its director called it. In August 1997 during Atom-97 exercise in the Murmansk region, Vympel group was trained to prevent capture of the Kolsk NPP and Siberia atomic icebreaker by terrorists. Lt.-Gen. Gerasimov made the following comment: "The threat of nuclear terrorism is still relevant in the Murmansk region."

In September 2001, a few days before the series of terrorist acts in New York and Washington the Russian law-enforcement agencies began the Atom-2001 exercise in Volgodonsk. The

exercise was sponsored by the FSB and involved the Alfa commandos, who learned how to prevent terrorist acts at the Rostov NPP.

### 86% of Russians Believe that Terrorists May Use Nuclear Weapons against Russia

The majority of Russians presume that nuclear weapons may become available to the terrorists. According to the sociological poll conducted by the PIR Center, 66% believe that terrorists may obtain access to the Russian nuclear arsenal. Only 22% rule out this possibility and 12% have no particular opinion.

Most Russians (54%) are sure that terrorists may acquire nuclear arms in other states. 22% again preclude this possibility.

Even fewer Russians doubt that the nuclear weapons in the hands of international terrorists might be used against Russia.

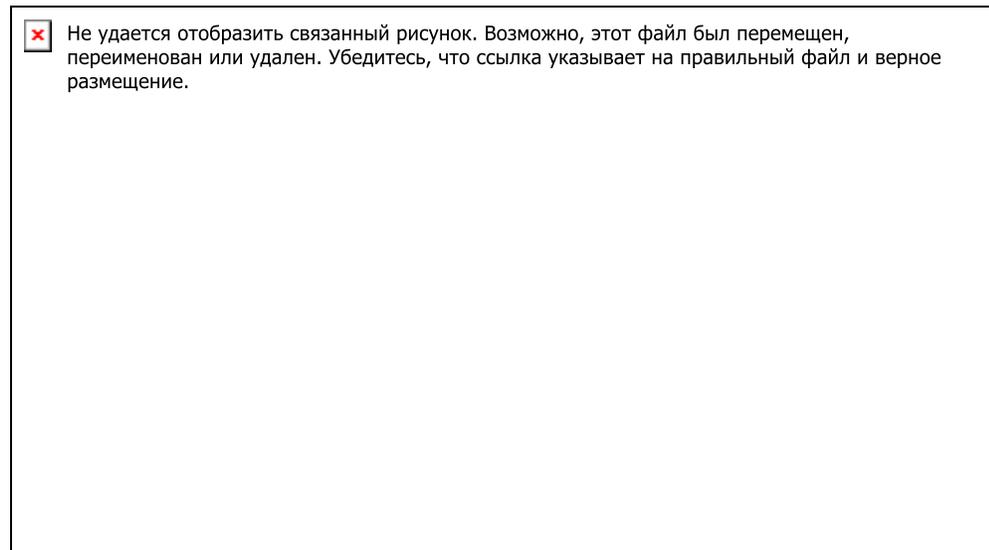
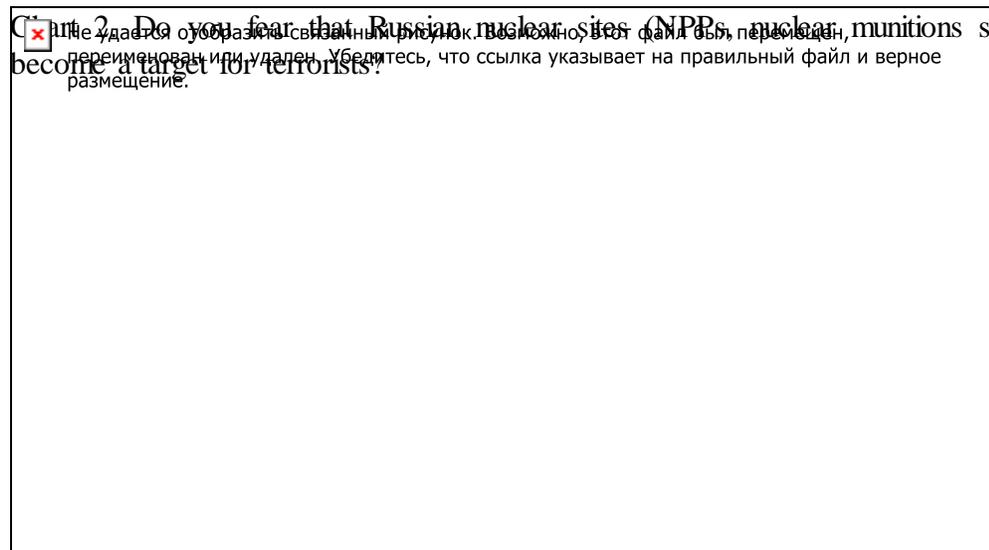


Chart 1. Do you fear that nuclear weapons, if acquired by international terrorists, might be used against Russia?

Another form of nuclear terrorism seems even more probable to Russians. They are afraid of sabotage against nuclear facilities more than the use of nuclear explosive devices.

❌ Chart 2. Do you fear that Russian nuclear sites (NPPs, nuclear munitions storage facilities) may become a target for terrorists?  
Не удается отобразить связанный рисунок. Возможно, этот файл был перемещен, переименован или удален. Убедитесь, что ссылка указывает на правильный файл и верное размещение.



Law-enforcement structures in Russia assess the possibility of nuclear terrorism and proceed from the assumption that the number of cases may increase, as the threat of illicit nuclear trafficking is diminishing. Russia realizes that this nonproliferation challenge is trans-border and supranational, so Moscow promotes international cooperation in combating nuclear and WMD terrorism.

#### Home Alone or Joint Actions?

Concerted international efforts to curb nuclear and other WMD-terrorism are crucial for the success of such activities. This cooperation should provide for:

appropriate legal measures to prevent preparation of WMD-terrorist acts on their territories, including measures to prohibit illegal activities of individuals, groups and organizations that support, instigate, organize or participate in WMD-terrorist acts;

exchange of information to prevent WMD-terrorism. As different opportunities (including financial) for super-terrorists emerge, counter-terrorist activities involving traditional political methods become less efficient. Under these circumstances, early exchange of intelligence data is decisive. This exchange should be strictly confidential, so that to avoid its interception by terrorists;

reports on the results of investigation to other states concerned, if WMD-terrorist acts take place or suspects of such terrorist activities are detained.

#### Reference Notes:

**Classification of Acts of Nuclear Terrorism** The acts of nuclear terrorism may be classified in the following manner:

**Detonation (or the threat of detonation) of nuclear explosive device.** The nuclear explosion is the most devastating act of terrorism. Hence, the security of strategic nuclear materials (highly-enriched uranium and plutonium) and nuclear munitions is vitally important for national security and should be the utmost priority in maintaining the security of nuclear complex. The threat of use of nuclear weapons by terrorists is still hypothetical.

**Contamination with radioactive materials.** The use of radioactive materials (cesium-137, plutonium, cobalt-60, etc.) in large-scale acts implies their dispersion in the form of aerosols or their dilution in water sources. Significant efforts must be taken to eliminate the consequences of such act. In most cases (dilution of plutonium in reservoirs, its dispersion in the form of aerosols, detonation of the container with cesium), radioactive contamination will be local and will not lead to tremendous damage. At the same time, according to some Russian experts, dispersion of the small amount of plutonium with the use of aircraft may result in consequences comparable to nuclear explosion.

Sabotage at nuclear facilities. In most cases the consequences of damaging research plants or nuclear fuel cycle enterprises will be local (within the industrial ground). Global catastrophe is possible if diversion is targeted against nuclear reactor of the NPP, which has higher radioactivity and high internal energy burning capacity.

The most probable threats to nuclear reactors of the NPPs are:

armed attack of the well-trained terrorist group, which may be facilitated by internal collaborators: terrorists may be armed with light weapons and have required equipment (tools, explosives), move by the four-wheel-drive vehicle;

sabotage of the employee (any position);

penetration of transport means filled with explosives.

### Targets of Nuclear Terrorism

The problems of international and domestic terrorism are topical for many countries that have developed nuclear energy sector. Serious indicators are explosions in Oklahoma City (1995), in New York World Trade Center (1994), detonation of dwelling houses in Moscow and other Russian towns (1999), terrorist acts of Algerian extremists in France and IRA militants in the UK.

The acts of nuclear terrorism may take place on the territory of any state both possessing nuclear fuel cycle facilities (about 40 countries, mostly with NPPs) and not possessing such facilities. Terrorists may transport stolen fissile materials across the borders. One cannot predict which state and which region run the highest risk of nuclear terrorism, for many terrorist organizations conduct transnational activities. At the same time, it is clear that statistically the highest threat is posed to the states with high concentration of nuclear energy facilities (including military facilities) and with high concentration of terrorist organizations. This list should also include the countries that often become victims of terrorist public threats. Thus, the most probable targets for terrorist activities are France, Israel, Japan, Russia, Armenia, Pakistan, and India. Among the regions the most vulnerable are North America, Europe, the Middle East, and East Asia.

It is also important to take into account the level of physical protection, the readiness of state structures and the personnel to repel the attacks. The problem of nuclear terrorism was realized in the West in the 1970s. Nowadays these nations have efficient, echeloned security systems at nuclear facilities and have long experience of combating terrorism.

As for Russia, the work has recently commenced, because before the early 1990s terrorism was practically unknown in the Soviet Union.

The level of physical protection of nuclear facilities in Israel, India, and Pakistan is quite high. However, the lack of international verification does not enable the world community to check it up.

There is practically no information about the level of physical protection of Chinese nuclear facilities (where terrorist organizations may intensify their activities for separatist purposes – in Xinjian and Tibet).

The most probable targets of nuclear terrorism are governments that may be blackmailed and have to face political demands. Besides, nuclear terrorism may be targeted against the following actors (in descending order): state and public figures;

representatives of national and ethnic groups;

representatives of religious groups.

#### About the Authors

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