

## NUCLEAR TERRORISM

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### *Summary:*

*The paper has analyzed different manifestations of terrorism with nuclear weapons and ionizing radiation as a special kind of terrorism. Possibilities that terrorist groups come into possession of nuclear weapons and apply them for terrorist purposes have been analysed. The forms and methods of terrorist activities with nuclear means have been given as well. It has been concluded that nuclear terrorism includes various forms of threats, including not only nuclear weapons but also the sources of ionizing radiation used for terrorist purposes. It has been also shown that the International Atomic Energy Agency (IAEA) and the countries signatories of the Treaty on the Nonproliferation of Nuclear Weapons and other international treaties seek to be an insurmountable obstacle to terrorist organizations aiming at the purchase of nuclear materials and equipment necessary for the construction of nuclear weapons.*

*Key words: weapons, nuclear terrorism, nuclear weapons, terrorism.*

## Introduction

A concise and accurate definition of terrorism cannot be determined. There are several definitions in literature. The USA government defines terrorism as premeditated, politically motivated violence against civil targets, done by ethnic groups or secret services with intention to attract public attention. In his book "Terrorism and free state", Paul Willkinson defines terrorism as "systematic killing and destruction of goods with the aim to intimidate individuals, groups, communities, and governments in order to achieve political aims" (Willkinson, 1986). Professor Milan Mijalkovski in his book "Terrorism of Albanian extremists" (Mijalkovski, Damjanov, 2002) pointed out to the problems in the determination of terrorism in different bibliographic sources.

According to a general definition from Vujaklija's Dictionary of Foreign Words, terrorism comprises a doctrine, methods and means of causing fear and insecurity to citizens through systematic violence. It stems from this definition that terrorism is any kind of action which induces fear in a particular group of people.

Terrorism is today spreading steadily throughout the world despite more and more organized efforts of the international community to take measures to combat it. It spreads and improves its technological level, with increasing efficiency. Modern technological development characterizing the 21st century also puts nuclear assets into the hands of terrorists. The permanent rise in deaths from terrorism can be seen in Figure 1.

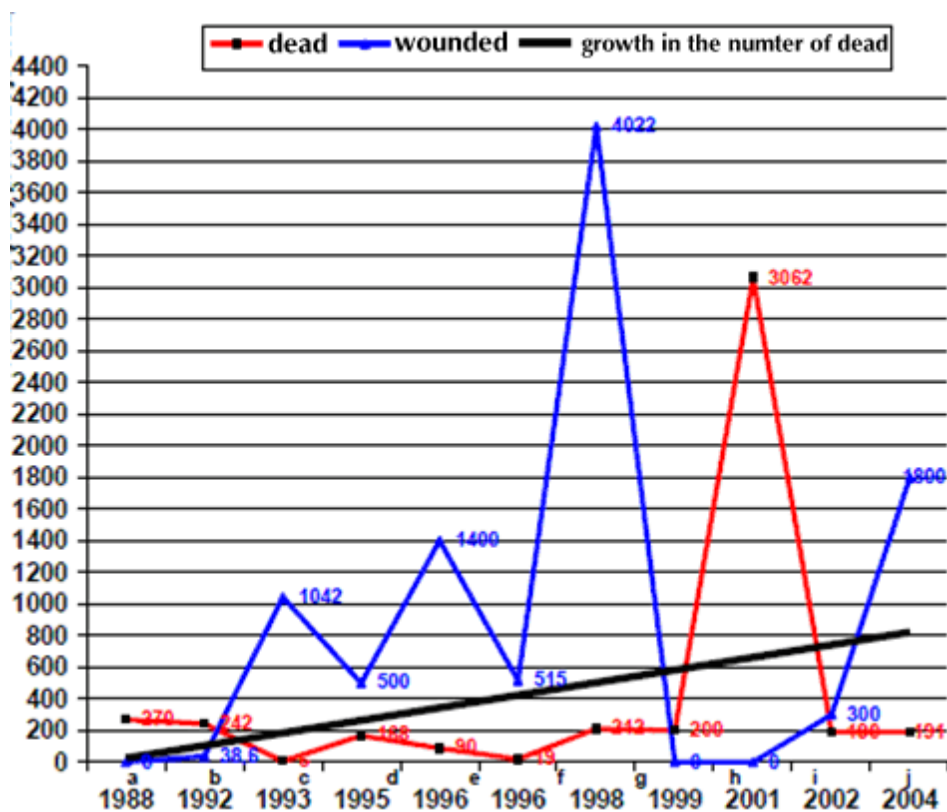


Figure 1 – The number of the **dead** and the **wounded** in terrorist attacks 1998-2004 (Ferguson, 2004)

Рис. 1 – Количество **погибших** и **раненых** в терактах 1998-2004 (Ferguson, 2004)

Slika 1 – Broj **mrtvih** i **ranjenih** u terorističkim napadima 1998–2004 (Ferguson, 2004)

Terrorism is possible to have conventional, unconventional, ecological and cyber forms (Figure 2). Although conventional terrorism is the prevalent form across the world, the danger from unconventional, ecological and cyber terrorism cannot be neglected (Gaćinović, 2012).

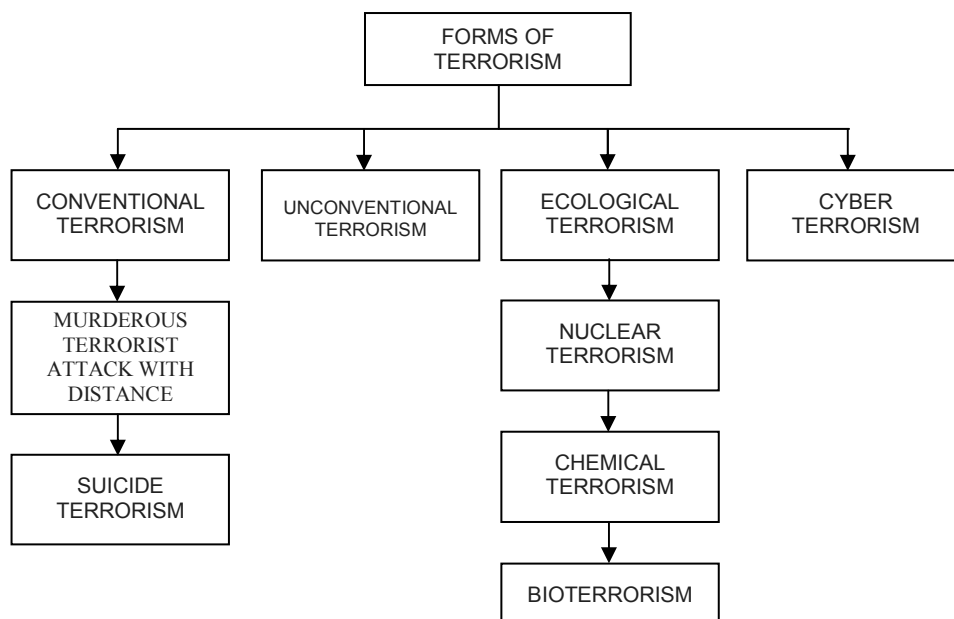


Figure 2 – Forms of terrorism (Gaćinović, 2012)  
 Рис. 2 – Формы терроризма (Gaćinović, 2012)  
 Slika 2 – Oblici terorizma (Gaćinović, 2012)

Nowadays, the nuclear arms race in order to achieve power and domination both at global and regional levels is proliferating. Not only legal countries but also terrorist and criminal organizations tend to acquire nuclear weapons in order to accomplish their goals. This kind of weapons is used to threaten other countries as a means of achieving political and other aims.

Nationalistic and ethnical groups, urban guerillas, and even some countries will continue to try to achieve their national, political, religious, social and government aims using terrorism with a new dimension of possible usage of WMD.

## Nuclear terrorism and terrorism with ionizing radiation

A nuclear terrorist attack is an attack in which a terrorist organization uses a nuclear device or radioactive material to cause mass destruction and damage. A nuclear terrorism attack involves a usage or a threat of using radioactive materials. Nuclear weapons can provide significant benefits to terrorists such as a large number of victims and the focus of attention of the world media. Western countries are particularly suspicious of blackmails of terrorists about undertaking a nuclear attack. Decision makers have no possibility to fully comprehend to what extent terrorists are really ready to carry out their threats.

The basic aim of nuclear terrorism is mass destruction of people, goods and widespread contamination in order to accomplish aims of terrorist organizations. Until recently, the threat of terrorist “nuclear action” seemed unlikely, due to the counter-productivity of mass killing nonselectivity.

Therefore, it was considered that terrorists’ primarily use of nuclear devices is not for killing a lot of people but for attracting a lot of attention and general insecurity. However, terrorists probably will not think of consequences, which should be taken into consideration when discussing real dangers of nuclear terrorism. It is obvious that this new danger should be in a particular focus of different international organizations, all well-organized states, i.e. armies, police forces, numerous experts and various social organizations.

Terroristic organizations can get radioactive material on the black market. Radioactive material can be bought from other countries, especially from revolutionary ones that support terrorism. Plutonium is the most common radioactive material obtained as a side product, for which resources and training are needed.

Terrorist organizations can get nuclear weapons in many ways; they neither have ethical issues nor are afraid of a possible nuclear answer or damage to their national interests in response to their attack. All this makes terrorist organizations dangerous.

A terrorist attack on a nuclear facility can cause nuclear contamination with serious consequences. (Radiological contamination during the accident in the Chernobyl reactor affected many European countries and a part of Asia, Figure 3).

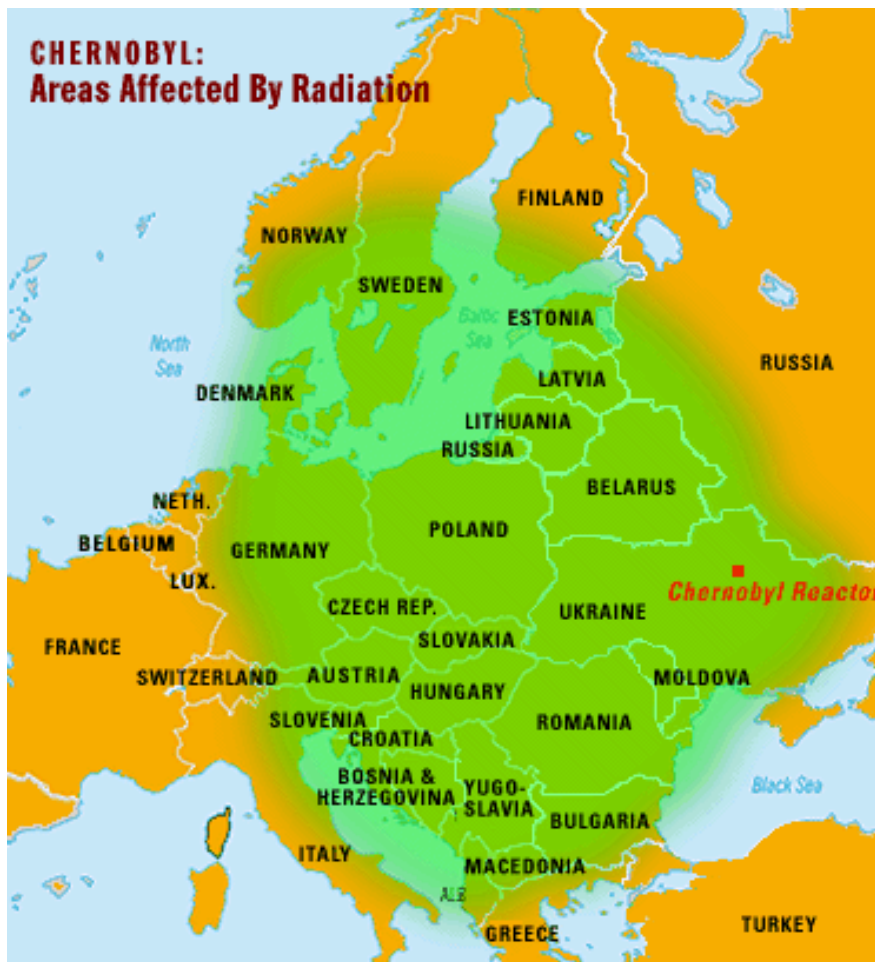


Figure 3 – Radiological contamination after the Chernobyl disaster (Amidžić, 2006)

Рис. 3 – Радиоактивное загрязнение после Чернобыльской катастрофы (Amidžić, 2006)

Slika 3 – Radiološka kontaminacija posle Čerobiljske katastrofe (Amidžić, 2006)

Nuclear terrorism includes many possibilities that do not have to include nuclear weapons, so it is more appropriate to talk about the use of nuclear materials for terrorist purposes. Therefore, three basic principles of action can be defined:

- use of nuclear explosive devices (nuclear explosions),
- attacks or sabotage in the existing nuclear facilities, and
- use of dirty bombs (conventional explosions by which radioactive material is dispersed into the environment) (Figure 4).



Figure 4 – Model of a suitcase – dirty bomb (Biočanin, 2005)  
 Рис. 4 – Модель „Чемодан – грязная бомба” Биоčanin, 2005)  
 Slika 4 – Model „kofer – prljave bombe” (Biočanin, 2005)

Risk assessment is very important when analyzing each of the given terrorist action methods. When assessing risks, it is necessary to foresee the efficiency of the actions and consequences of each method at an expert level as well the probabilities of their occurrence (Gaćinović, 2012).

The most important factors while assessing the risk from nuclear weapons and sources of ionizing radiation used for terrorist purposes are probability factors (securing medical institutions and other potential sources, number of radiological sources, development of nuclear programs at regional levels, complying with international agreements on non-proliferation, etc.), influence factors (crisis management, availability of equipment for ionizing radiation dosimetry, economic influence, etc.) and other factors.

During WMD risk assessments, risks must be evaluated from two standpoints: the first one is a qualitative approach to the risk which investigates the characteristics of a possible risk, i.e. intensity and seriousness of the event consequences, and the second one is a quantitative approach used to determine the likelihood of the event. (Čaldarović, 1995).

A risk is determined as a product of state actors, groups (non-state actors, substate actors) and hostile unaffiliated individuals that have a tendency to acquire WMD and a possibility that they possess it. In other words, a risk is always present when such entities have

access to these weapons. An additional risk factor includes means for transport of these weapons (weapons – carriers), especially long range ballistic missiles, that can perform „projection of fear and power“ (Power Projection), inflicting casualties and physical damage from great distance (Kamp, 2004).

It is important to emphasize that a WMD danger analysis cannot be based on the mere fact that some country has WMD. This fact is crucial, but it must be combined with intentions and strategies. For example, the fact that France and the UK have nuclear weapons does not present a risk for their European allies, because they already have traditionally friendly relations with them and there is no assumption of nuclear threat to any other European state. In order to understand the risk of WMD proliferation, it is necessary to understand the situation that can force the states that possess WMDs to use them against the European Union.

The third element in risk assessment is international legal instruments. A threat that can be diminished by applying these instruments is smaller than the one to which these instruments are not applicable, which is the greatest difference between the state actor threats and those coming from non-state actors. Therefore, a threat assessment is performed by analysing all these elements and their relations to the European Union (Klasan, 2012).

### *Manifestations of nuclear terrorism*

Since nuclear terrorism is an activity carried out by means of high technology, it was considered, almost to the end of the twentieth century, that it was highly unlikely to occur since radioactive materials are generally well protected, expensive and dangerous, so they used to be difficult to acquire and possess, as well as to be expertly handled and kept in secret. However, at the beginning of the 21st century, the situation changed completely. Today's availability of information has made nuclear technology available to thousands of scientists in developing countries, which, with uncontrolled acquisition of nuclear materials on the black market and weak international control, poses a major threat. Also, designing an atomic bomb is fairly easy since information is available in scientific literature and state archives.

At the end of the twentieth century, civilian factories were producing annually 500 tons of plutonium-239, while for a bomb that can destroy a medium-size town it takes only ten kilograms of plutonium. The Washington Nuclear Surveillance Institute presents the information that for a bomb the strength of which is equal to the one thrown at Nagasaki is enough 14 kilograms of highly enriched Uranium or 9 kilograms of

Plutonium. When the application of these isotopes for terrorist purposes and their danger to civilian population is concerned, plutonium toxicity is of significant importance. According to the fatal toxicity scale, plutonium is 20,000 times more dangerous than cobra poison or potassium cyanide. Only one inhaled particle, size of a pin head, can result in death after a few days, and smaller amounts can cause cancer (Biočanin, 2004, p.136).

Instead of using atomic bombs, terrorists may poison people with plutonium dust. If only a few grams of plutonium is put into a water supply tank, water will become highly radioactive, or it will be unusable for drinking, thus representing a risk to people's lives. In addition to plutonium, radionuclides such as strontium, polonium, radium, actinium, and iodine-131 are particularly dangerous as well as all other radionuclides used in civilian organizations (for industrial and medical purposes) and nuclear power plants.

A very soluble chemical substance known as uranyl-nitrate, commonly used in chemical laboratories, can be also used for the contamination of water supply systems.

A very significant aspect of nuclear terrorism presents an attack on nuclear facilities (power plants, reactors) to take them under control so that they can be used for blackmailing, threatening, instilling fear among local population as well as for attracting publicity. In these situations, antropogenic catastrophes can be created and expressed as a large scale accident with heavy casualties. There were roughly 508 nuclear accidents from 1993 to 1999 worldwide, which presents more than one per each of 434 nuclear objects in the world. It is known that the first commercial nuclear reactor was built in Sellafield and opened by Queen Elizabeth II. It has been working for more than 54 years although initially it had been planned to work for 25 years. Great Britain is the first European country that decided to close one of its reactors – Dounreay near Thurso in north Scotland. Its closure process will last for 100 years and will cost approximately 740 million pounds (Gaćinović, 2005, p.130).

During the aggression on Serbia, NATO used nuclear violence against all citizens of the Republic of Serbia, and American General Michael Short, head of the NATO Air Force operations in that period, stated: „War cannot be gained if we do not destroy a possibility of normal life for most of the citizens. We must take them water, electricity, food, and even the healthy air“. During that war, NATO fired over 30,000 projectiles with depleted uranium, which is about 17 tones of uranium, and the uranium half-life time is 4.5 billion years (Andrić, Krsmanović, 2000, p.127). The locations in Serbia where the munition with depleted uranium was used during NATO bombings in 1999 are shown in Figure 5.





Figure 5 – Sites in Kosovo and southern Central Serbia where NATO aviation used forbidden munition with depleted uranium during the 1999 bombing  
Рис. 5 – Дислокации в Косово и юге Центральной Сербии, где воздушные силы НАТО использовали запрещенные боеприпасы с обедненным ураном во время бомбардировок 1999г.

Slika 5 – Lokacije na Kosovu i Metohiji i jugu centralne Srbije na kojima je NATO avijacija koristila zabranjenu municiju sa osiromašenim uranijumom tokom bombardovanja 1999. godine

Modern genetics says that such high concentrations of uranium can leave consequences in the human organism even after 60 generations after the exposure. Radiologists warn that one alpha particle can induce one cancer cell which, by the cloning theory, does not destroy just tissue but life itself. The fact that one company near New York was closed because it used to release 500 g of uranium in the air monthly confirms that the USA has a policy of protecting their own citizens. Only one

projectile fired from an A10 aircraft has 300 g of uranium - the Serbian territory was covered with over 30,000 of such projectiles during NATO air strikes, which presents a serious life-long threat to many Serbian citizens.

Since World War II, the world has not been able to escape nuclear weapon threats in spite of signed agreements. Only in the second half of 20th century, 514 air nuclear explosions and 1,600 underground nuclear explosions occurred. The Missile Technology Control Regime was established in 1983 with the aim of preventing an increase of the number of countries which possess technologies for nuclear missile production (Taylor, Horgan, 2000, p.113).

According to Theodore Taylor, the author of arguably the most comprehensive study about the dangers of nuclear terrorism, the only problem in nuclear bomb production is nuclear material; however, it can be procured on the black market with enough financial means.

A nuclear component of international terrorism is now reality which all countries must take into consideration. Nowadays, at the beginning of 21st century, small but very dangerous weapons are being produced, e.g. there are 0.1 KT nuclear bombs weighing only 37 kg (Gaćinović, 2012). There are indications that the USA and Russia possess nuclear weapons of a very small strength of 0.1 KT whose weight is just 27 kg. These are two types of weapons, SM-50 and D-444, which could be a great danger if they become available to terrorists.

Nuclear weapons are weapons with the most destructive effects. Unlike chemical and biological weapons, they can cause massive destructions to civil engineering structures and infrastructures. On the one hand, biological weapons, if used in a certain way, could be more dangerous than nuclear ones. On the other hand, if they are detected in time, it is easier to defend civilian population from biological and chemical weapons than from nuclear weapons. Chemical weapons must be used in large quantities to achieve similar lethal effects like nuclear and biological weapons. Against well protected targets, they could have even less deadly effects than conventional weapons. Because of a great dependence on weather and protection levels, the effects of chemical and biological weapons are less predictable than those of nuclear weapons. Figure 6 presents the effects of nuclear, chemical and biological weapons, with a presumption of using a nuclear bomb with a mass of 1000 kg and strength of 12.5 KT, 300 liters of Sarin and 30 kg of Antrax for a territory of 3,000-10,000 citizens/km<sup>2</sup>.

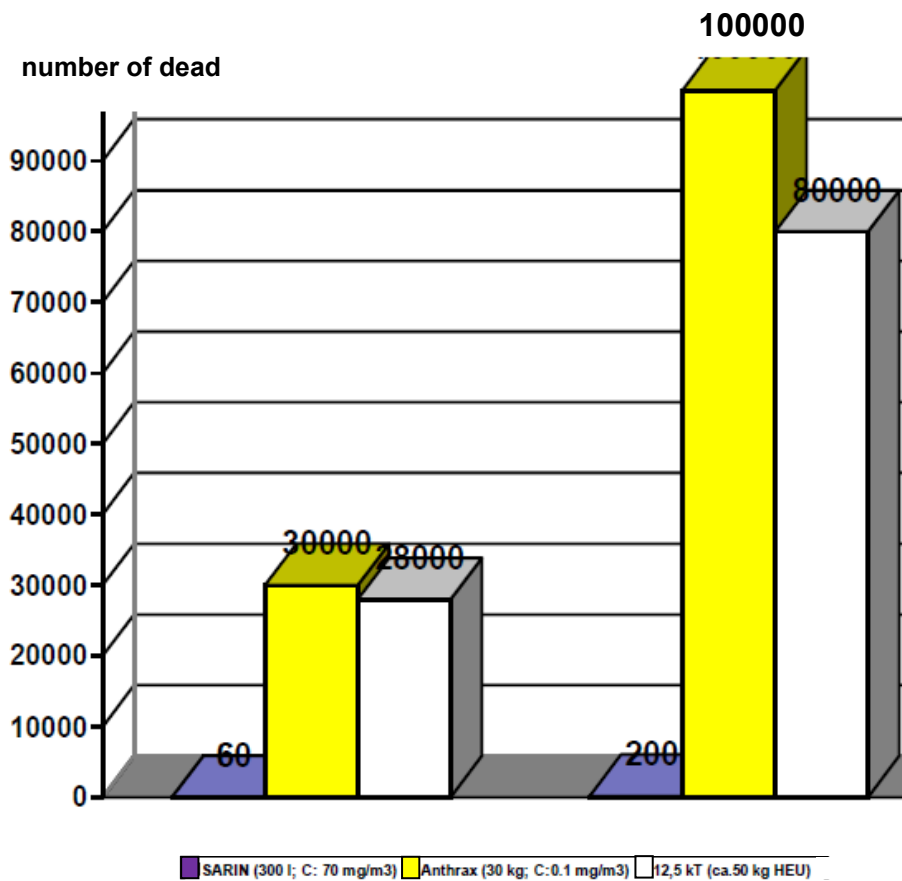


Figure 6 – Lethal effects of chemical, biological and nuclear weapons (Cordesman, 2002).

Рис. 6 – Эффекты поражающего действия химического, биологического и ядерного оружия Cordesman, 2002).

Slika 6 – Efekti ubojnog dejstva hemijskog, biološkog i nuklearnog oružja (Cordesman, 2002).

Today's information explosion makes nuclear technology available to thousands of scientists from developing countries, which, with uncontrolled smuggling of nuclear material on the black market and weak international control, presents a great danger. Generally, making a nuclear bomb is quite simple, and information about that is available in literature and national archives. In 1976, Aristotel Filips, a student of the third year of nuclear physics at Princeton university, USA, made a project paper in which he showed how easy it was to make a nuclear **bomb**

using a DIY approach. His work is full of detailed plans of production and nuclear weapon experts concluded that such a bomb would be very effective. Bomb shape: sphere, radius: 60 cm, mass: 38 kg, production price (plutonium not included): 2,000 dollars, strength: 1/3 strength of the bomb dropped on Hiroshima.

To make a nuclear weapon, it is necessary to have a certain amount of fission explosive. Fission explosives are usually enriched uranium – 235 ( $^{235}\text{U}$ ) and plutonium – 239 ( $^{239}\text{Pu}$ ); uranium – 233 ( $^{233}\text{U}$ ) can also be used. Uranium – 233 is the most appropriate for small explosive devices such as tactical nuclear bombs. The quality of fission explosive is very important. The least content of fission isotopes in the material for making nuclear weapons is in a range of 10 – 20 %. Uranium with enriching content of more than 20% for  $^{235}\text{U}$  is designated as highly enriched uranium (HEU). Uranium used for this purpose is usually enriched 90 % for  $^{235}\text{U}$ . The critical mass (mass of the fission material needed for maintaining a chain fission reaction) is necessary for nuclear weapons production. The following values of the critical mass are needed for nuclear weapon construction: 10 – 15 kg  $^{235}\text{U}$ , about 5 kg of  $^{239}\text{Pu}$  and 4.5 kg of  $^{233}\text{U}$ . With enrichment decreasing, the critical mass of  $^{235}\text{U}$  increases, which is not so important for  $^{239}\text{Pu}$  (Lazarević, et al., 2003).

Nuclear weapon construction based on plutonium has its own difficulties:

- mechanical shaping of plutonium is more complex than shaping of uranium,
- the complex implosive technique for creating an explosion is needed for plutonium, while for uranium simple techniques can be used,
- for a plutonium nuclear bomb, it is necessary to carry out previous research, while the first uranium bomb was used without previous research.

Nuclear material can get into the hands of terrorists by hijacking during the transport of nuclear material from countries that have nuclear weapons, by illegal leaking over secret channels from nuclear reactors or via the black market of nuclear material.

Highly enriched uranium is especially interesting for terrorists because of a few reasons: it can be used in a simple nuclear weapon in which plutonium cannot be used, it is less radioactive and dangerous for handling than plutonium, and it is easier for transporting, stocking and turning into a weapon.

Nowadays, the following countries possess nuclear weapons: the USA, Russia, Great Britain, France, Israel, China, India, Pakistan and South African Republic while potential producers are: Brazil, Argentina, Mexico, Japan, Canada, Italy, South Korea and Iraq. Beside the mentioned nuclear weapons, there are over 600 nuclear reactors for

production of electrical energy and science research worldwide. There are numerous sensitive spots on nuclear reactors where terrorists can secretly take out nuclear material. This method of supplying necessary amounts of nuclear material for nuclear weapon construction is done unnoticeably in a long period of time.

In an incident in 1992, the amount of 1.5 kg of 90 % enriched uranium was stolen from a production plant in Podolsk (Russia).

In an incident in 1994, the amount of 3 kg of 90 % enriched uranium was stolen in Moscow.

The Czech police took almost 3 kg of enriched uranium in Prague in December 1994.

Only during 1993 and 1994 in Germany, more than 300 cases of smuggling of radioactive material were discovered, which worried Western Europe because of a possibility that nuclear WMD can be sold to interested countries or international terrorist groups. Smugglers of radioactive materials were discovered in Italy, and in 1997 in Skoplje, Macedonia, three people were arrested under suspicion that they were smuggling highly radioactive uranium. During that operation, 250 g of uranium was found in one apartment.

During a theft of nuclear material in the Cheljin region, the Russian official report stated that there was enough amount of nuclear material to produce a nuclear bomb. That is the only theft of nuclear material described in that way.

The Japanese sect "Aum Sinrikjo", responsible for poisoning thousands of people in the Tokyo metro, tried to dig uranium in Australia in 1995 and to buy nuclear warheads in Russia. In one media story in Sunday Times (6.10.2002, London), it was written that reporters (Justin Sparks and Peiter Konradi), under false identity, made an agreement to buy a radio therapeutic device from the owner of one Czech company. The bought device (with 70 g of Co) was to be sent to help a project in Nigeria. Nuclear experts claim that, with that amount of Co, terrorists could contaminate the London city center.

The incident in Moscow in November 1995, when Chechen terrorists hid a small amount of cesium – 137 (radioactive substance used in medical and industrial purposes) in a park, serves as proof that a possibility of using different nuclear materials is not insignificant. Luckily, they did not know how to activate it. Had that amount of cesium been spread, the whole park would have been contaminated with a low level of radiation; what is more important is the psychological effect which would have been accomplished. In 1950s and 1960s, the technology of production and application of combat radioactive materials and radioactive poison gases was developing. Both of the mentioned weapons were based on the usage of radioactive waste.

## *Forms and methods of protection against nuclear terrorism*

The international community has been trying to gain control over nuclear weapons for years through different forms of international agreements and organizations, in order to stop their use in war actions, but also to erase a possibility of its falling into hands of terroristic organizations. The International Atomic Energy Agency (IAEA) was formed in 1957. With the development of nuclear energetics, there appeared a danger of uncontrolled spreading of nuclear weapons among countries that had not possessed them previously. The Agreement on Non-Proliferation of Nuclear Weapons (Nuclear Nonproliferation Treaty) was signed in July 1968, and two years later it entered into force. It is believed that this agreement is essential in preventing the spread of nuclear weapons (Šuković, 2004, pp.291-308). It was signed for the duration of 25 years but in 1995 it was changed to last without limit and it became obligatory for the countries that had nuclear weapon at that time (USA, USSR, Great Britain, France and China). On the meeting held on July 31st 1985, organized by the IAEA, 84 states-members of Nuclear Nonproliferation Treaty agreed on nonproliferation guarantees. India, Pakistan and Israel did not sign this document, so they gained their nuclear status without breaking this international obligation. North Korea withdrew from the Treaty before getting its nuclear status, in 1993. This Agreement is aimed to prevent the spread of nuclear weapons and to encourage negotiations on effective measures to suspend the race for nuclear armament and general disarmament under strict international control. The Agreement has been signed by 200 countries.

However, the IAEA was not a sufficient barrier to prevent the spread of nuclear weapons. Economic barriers were not insurmountable obstacles either, because every country that has a peaceful nuclear program can allocate sufficient financial and human resources for the production of nuclear weapons. The most important measures for preventing the spread of nuclear weapons and preventing the secret removal of material from plants are:

- keeping records on the amount of nuclear material,
- measures to protect nuclear facilities and nuclear materials, and
- control measures.

For controlling the amount of nuclear material, a term “material balance zone” was introduced. It is defined as a zone inside and outside a nuclear facility (where the flow of material is being performed) in which a material balance must be obtained. Material amount control was significantly simplified and improved by importing special devices capable of evaluating the amount of fission material in nuclear facilities. Specific protection measures concern measures such as: physical protection,

construction of special transport containers for transport of nuclear material and other constructive solutions that have the task to increase the protection of nuclear material. Control measures comprise information gathered by special devices on nuclear facilities and the control of nuclear material amounts exerted by supervising inspectors of the IAEA. Although the work of the agency depends a lot on national bodies for achieving a balance of nuclear material, the Agency itself also performs independent controls and procedures. Guarantees do not encompass nuclear materials obtained in ore extraction and processing. All states are obliged to inform the IAEA on every exchange of materials containing uranium, plutonium and thorium, with countries that do not possess nuclear weapons, excluding cases of exchange of non-nuclear materials. By combining technical and organizational obstacles, security of civil nuclear facilities is increased, including stronger measures of physical security of nuclear facilities, which presents a real approach to the problem of preventing nuclear proliferation. Different devices, including ionizing radiation detectors, placed at entrance and exit spots as well as all over a nuclear facility, can present efficient means for discovering a covert transfer of nuclear material out of the facility (Lazarević, et al., 2003).

## Conclusion

Terrorism is a major problem of the modern society and an obstacle to the development of the modern world. Simultaneously with the development and progress of the mankind in technical, financial and cultural terms, terrorism also develops, but at a faster pace. Terrorism is constantly changing its form, content, types and forms of organization, methods of operation, technical equipment, etc. Nuclear terrorism incorporates various forms of threats, which may include not only nuclear weapons but also the sources of ionizing radiation applied for terrorist purposes. The main objective of nuclear terrorism is to use nuclear weapons for mass destruction of people, material goods and for contamination of large areas, in order to achieve the goals of terrorist organizations.

The use of nuclear weapons for terrorist purposes is possible and realistic, taking into consideration that the level of technical knowledge in the world is growing, that the methods of making such devices are available to the public in a variety of professional scientific journals and that the access to nuclear materials has become increasingly easier.

The International Atomic Energy Agency (IAEA) through the Non-Proliferation of Nuclear Weapons and other international treaties, together with the signatory countries, tends to be an insurmountable obstacle to terrorist organizations for the purchase of nuclear material and equipment necessary for the construction of nuclear weapons.

In the incoming period, in order to improve the protection against a possible use of nuclear materials for terrorist purposes, it is necessary that the Signatory Countries:

- apply protective measures in accordance with the Treaty on the Non-Proliferation of Nuclear Weapons,
- consistently implement the provisions of the Protocol to the Agreement between the signatory states and the International Atomic Energy Agency on the application of protective measures with regard to the Treaty on the Non-Proliferation of Nuclear Weapons.

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## ЯДЕРНЫЙ ТЕРРОРИЗМ

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ВИД СТАТЬИ: профессиональная статья

ЯЗЫК СТАТЬИ: анлийский

### Резюме:

*В статье представлен обзор различных проявлений ядерного терроризма и терроризма с применением ионизирующего облучения, как особой формы терроризма. Проведен анализ возможностей доступа террористических группировок к ядерному оружию и его применения в терактах.*

*В статье описаны формы и методы борьбы с терроризмом и защиты от действия ядерного оружия. Сделаны выводы, что ядерный терроризм представляет разные формы угроз, связанных не только от ядерного оружия, но и от источников ионизирующего облучения.*

*В заключении представлена деятельность Международного агентства по атомной энергии (IAEA), направленная на борьбу с ядерным терроризмом через и другие международные соглашения, предотвращая таким образом возможность снабжения террористических организаций ядерными материалами и необходимым оборудованием для создания ядерного оружия.*

Ключевые слова: оружие, ядерный терроризм, ядерное оружие, терроризм.

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## NUKLEARNI TERORIZAM

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OBLAST: zaštita od NHB oružja

VRSTA ČLANKA: stručni članak

JEZIK ČLANKA: engleski

### Sažetak:

*U radu se govori o načinima ispoljavanja terorizma nuklearnim oružjem i izvorima jonizujućeg zračenja kao posebnom vrstom terorizma. Analizirane su mogućnosti da terorističke grupe dođu u posed nuklearnog oružja i da ga primene u terorističke svrhe. Sagledani su oblici i metode zaštite od terorističkih dejstava nuklearnim sredstvima. Zaključeno je da nuklearni terorizam sadrži različite oblike pretnji koje mogu*

uključivati ne samo nuklearno oružje već i izvore jonizujućeg zračenja u terorističke svrhe.

Međunarodna agencija za atomsku energiju (IAEA) i zemlje potpisnice, kroz Sporazum o neširenju nuklearnog oružja i druge međunarodne ugovore, nastoje da terorističkim organizacijama budu nepremostiva prepreka za nabavku neophodnih nuklearnih materija i potrebnih uređaja za konstrukciju nuklearnog oružja.

#### Uvod

Danas je terorizam u stalnom porastu, bez obzira na sve organizovanije suprotstavljanje međunarodne zajednice i na mere koje se preduzimaju radi njegovog suzbijanja. On se obnavlja i usavršava na sve višem tehnološkom nivou, a efikasnost mu se stalno povećava. Savremeni tehnološki razvoj, koji karakteriše XXI vek, stavio je u ruke terorista

#### Teroristički napadi nuklearnim oružjem i izvorima jonizujućeg zračenja

Nuklearni teroristički napad je onaj u kojem teroristička organizacija koristi nuklearnu napravu ili radioaktivni materijal kako bi prouzrokovala masovna ubistva i štete. Nuklearni terorizam prilikom napada uključuje upotrebu ili pretnju upotrebom radioaktivnih materijala. Nuklearno oružje može teroristima omogućiti znatne prednosti, kao što su veliki broj žrtava i fokusiranje pažnje svetskih medija. Zapadne zemlje su posebno sumnjičave prema ucenama terorista u preduzimanju nuklearnog napada. Oni koji odlučuju nemaju načina da u potpunosti sagledaju koliko su teroristi stvarno spremni da ostvare svoje pretnje.

Definisan su tri osnovna principa delovanja:

- upotreba nuklearne eksplozivne naprave (nuklearna eksplozija),
- napad ili sabotaza na postojećim nuklearnim postrojenjima i
- upotreba tzv. prljave bombe – klasična eksplozija pomoću koje se radioaktivni materijal raspršuje u okolinu.

#### Način ispoljavanja terorizma nuklearnim sredstvima

Pošto je nuklearni terorizam aktivnost koja se sprovodi pomoću visoke tehnologije, smatralo se skoro do pred kraj XX veka da je to malo verovatna aktivnost, jer su radioaktivni materijali u principu dobro čuvani, skupi su i opasni, tako da ih je bilo teško nabaviti, imati u posedu, njima stručno rukovati i sve to držati u tajnosti. Međutim, na početku XXI veka situacija se u tom smislu u potpunosti promenila.

Nivo tehničkog znanja u svetu sve više raste, uputstva za izradu takvih naprava se javno objavljuju u raznim stručnim naučnim časopisima, a pristup nuklearnim materijalima postaje sve jednostavniji.

Pri kraju XX veka u svetu se u civilnim fabrikama proizvodilo godišnje 500 t plutonijuma-239, a za bombu koja može da uništi grad srednje veličine potrebno je samo deset kilograma plutonijuma.

*Za trovanje stanovništva teroristi mogu upotrebiti i plutonijumsku prašinu. Ako se samo nekoliko grama plutonijuma ubaci u rezervoar vodovoda voda će postati visokoradioaktivna, odnosno biće neupotrebljiva za piće i predstavljaće rizik po živote ljudi. Pored plutonijuma, posebno su opasni radionuklidi: stroncijum, polonijum, radijum, aktinijum, jod-131 i svi ostali radionuklidi koji se koriste u civilnim organizacijama (za industrijske i medicinske svrhe) i nuklearnim postrojenjima.*

*Različiti su putevi pomoću kojih teroristi mogu doći do nuklearnih materijala – oružanim putem preko otmica u toku prevoza nuklearnog materijala koji organizuje država koja poseduje nuklearno oružje, ilegalnim oticanjem preko „tajnih kanala” iz nuklearnih reaktora nekih država ili preko „crnog tržišta” nuklearnog materijala.*

Oblici i metode zaštite od terorističkih dejstava nuklearnim sredstvima

*Međunarodna agencija za atomsku energiju (International Atomic Energy Agency, IAEA) formirana je 1957. godine.*

*Sporazum o neširenju nuklearnog oružja (Nuclear NonProliferation Treaty) potpisan je u julu 1968. godine, a dve godine kasnije stupio je na snagu. Smatra se da ovaj sporazum ima centralno mesto u režimu sprečavanja širenja nuklearnog oružja (Šuković, 2004, pp.291-308).*

*Ugovor je imao za cilj da spreči širenje nuklearnog oružja i da podstakne pregovore o efikasnim merama za obustavu trke za nuklearnim naoružavanjem i sveopštem razoružavanju pod strogom međunarodnom kontrolom. Sporazum je do danas potpisalo 200 država.*

*Međutim, IAEA nije bila dovoljna prepreka da se spreči širenje nuklearnog oružja. Takođe, ni ekonomske barijere nisu bile nesavladive prepreke, budući da svaka zemlja koja ima miroljubiv nuklearni program može izdvojiti dovoljne finansijske i ljudske resurse za proizvodnju nuklearnog oružja. Najvažnije mere za sprečavanje širenja nuklearnog oružja i sprečavanje tajnog iznošenja materijala iz postrojenja su:*

- vođenje evidencije o količini nuklearnih materijala,*
- mere zaštite nuklearnih postrojenja i nuklearnih materijala i*
- mere kontrole.*

Zaključak

*Terorizam je veliki problem savremenog društva i prepreka na putu razvoja savremenog sveta. Istovremeno sa razvojem i napretkom čovečanstva, u tehničkom, materijalnom i kulturnom pogledu razvija se i terorizam, samo još bržim tempom. Neprestano se menja i po formi, sadržini, tipovima i oblicima organizovanja, načinima delovanja, tehničkoj opremljenosti i slično. Nuklearni terorizam sadrži različite oblike pretnji koje mogu uključivati ne samo nuklearno oružje već i izvore jonizujućeg zračenja primenjene u terorističke svrhe. Osnovni cilj nuklearnog terorizma jeste da se upotrebom nuklearnog oružja izvrši masovno uništavanje ljudi, materijalnih dobara i kontaminacija velikih površina, radi ostvarivanja ciljeva terorističkih organizacija.*

*Upotreba nuklearnog oružja u terorističke svrhe je moguća i realna, imajući u vidu da nivo tehničkog znanja u svetu sve više raste, da se načini izrade takvih naprava javno objavljuju u raznim stručnim naučnim časopisima i da je pristup nuklearnim materijalima postao sve jednostavniji.*

*Međunarodna agencija za atomsku energiju (IAEA) kroz Sporazum o neširenju nuklearnog oružja i druge međunarodne ugovore, zajedno sa zemljama potpisnicama teži da bude nesavladiva prepreka terorističkim organizacijama za nabavku neophodnih nuklearnih materijala i potrebnih uređaja za konstrukciju nuklearnog oružja.*

*Da bi se unapredila zaštita od moguće upotrebe nuklearnih materijala u terorističke svrhe u narednom periodu neophodno je da države potpisnice:*

- primenjuju zaštitne mere u vezi sa Ugovorom o neproliferaciji nuklearnog oružja,*
- dosledno sprovode odredbe Dodatnog protokola uz Sporazum između nje i Međunarodne agencije za atomsku energiju o primeni zaštitnih mera u vezi sa Ugovorom o neproliferaciji nuklearnog oružja.*

*Ključne reči: oružje, nuklearni terorizam, nuklearno oružje, terorizam.*

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