Creation of CBRNE protection system for large area shopping malls

HANDBOOK

FOR PREVENTING AND RESPONDING TO THE CBRNE THREATS IN SHOPPING MALLS

Co-funded by the Internal Security Fund
of the European Union
Grant Agreement No. 861643 - Mall-CBRN

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Abbreviations

AC – hydrogen cyanide,
AChE – acetylcholinesterase
AT – anti terrorist
BWA – The Biological Weapons Convention (The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction)
BZ – 3-Quinuclidinyl benzilate
CBRN – Chemical, Biological, Radiological and Nuclear materials
CC – phosgene
CCP – Critical Control Points
CCTV – Closed-Circuit Television
CDC – The Centre for Disease Control and Prevention
CK – cyanogen chloride
CN – chloracetophenone
CR – dibenzoxazepine
CS – 2-chlorobenzalmalononitrile
CWA – Chemical Warfare Agent
CWC – The Chemical Weapons Convention (The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction)
DP – Diphosgene
ERG – Emergency Response Guide
FM – Facility Management
FPD – Flame Photometric Detector
FTIR – Fourier Transformation Infra-Red
GC – Gas Chromatography
GCMS – Gas Chromatography Mass Spectrometry
GHP – Good Hygienic Practice
GMP – Good Manufacturing Practice
HACCP – Hazard Analysis and Critical Control Points
ICT – information and communication technologies
IDLH - Immediately dangerous to life or health
IMS – Ion Mobility Spectrometry
IR – Infra-red
JESIP- Joint Emergency Services Interoperability Principles
LSD25 - Lysergic acid diethylamide
PPE – Personal Protective Equipment
PS - Chloropicrin
SA – arsine
SM – Shopping Mall
SN – Phencyclidine
TIC – Toxic Industrial Chemical
TIM – Toxic Industrial Material
UAV – Unmanned Aerial Vehicle
USAMRIID – U.S. Army Medical Research Institute of Infectious Diseases

Content

1. INTRODUCTION

The chemical, biological, radiological and nuclear threat should never be neglected as the potential effect on unprepared is extremely deadly. Despite The Bioweapon Convention and more successful The Chemical Weapons Convention[1] the threat of potential use of chemical weapon during military operations is still high and all the armies across the world sustain capabilities to deal with chemical weapon. Moreover none of terrorist organization is expected to respect this convention. In the history there were many attempts to use chemical, biological or radiological agents against unprepared population by terrorist organization.

Between 1 of January 1970 and the end of 2018 there were 390 CBRN terrorist incidents, 930 people died and more than 14 000 were injured. This type of attack is not very likely, only 0,3% of total terrorist incidents were related to CBRN but if it happens number of victims could be huge like it was in Tokyo subway attack with sarin – more than 5000 people were injured.

[1] The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction

"It would be very well if we could avoid it"
gen. John Pershing once said about chemical warfare

It is not possible to totally avoid the threat from CBRN agents but the goal of the project is to reduce risks of it, to prevent and minimize possible effect of this type of attack. The objective of this handbook is to provide relevant information to all identified target groups relevant to CBRN security in shopping malls.

Those information should then adopted and implemented to interested shopping malls to:

- Prepare shopping centres for a CBRN incident
- Provide security advice for SM staff and tenants during such an incident
- Manage the scene till arrival of dedicated services

This handbook provides recommendations for equipment and procedures of acting before, during and soon after CBRNE accident. These are universal rules for sites that are particularly vulnerable due to their characteristics (crowding and gathering at one time a large number of potential defenceless victims). This study aims to reduce the risk of a terrorist attack and limit its effects. Terrorists can both identify and exploit weaknesses in the security system, which is why the information contained here will help to identify weak and potentially dangerous points that should be paid special attention to so that joint efforts have a positive impact on the safety of their employees and customers.

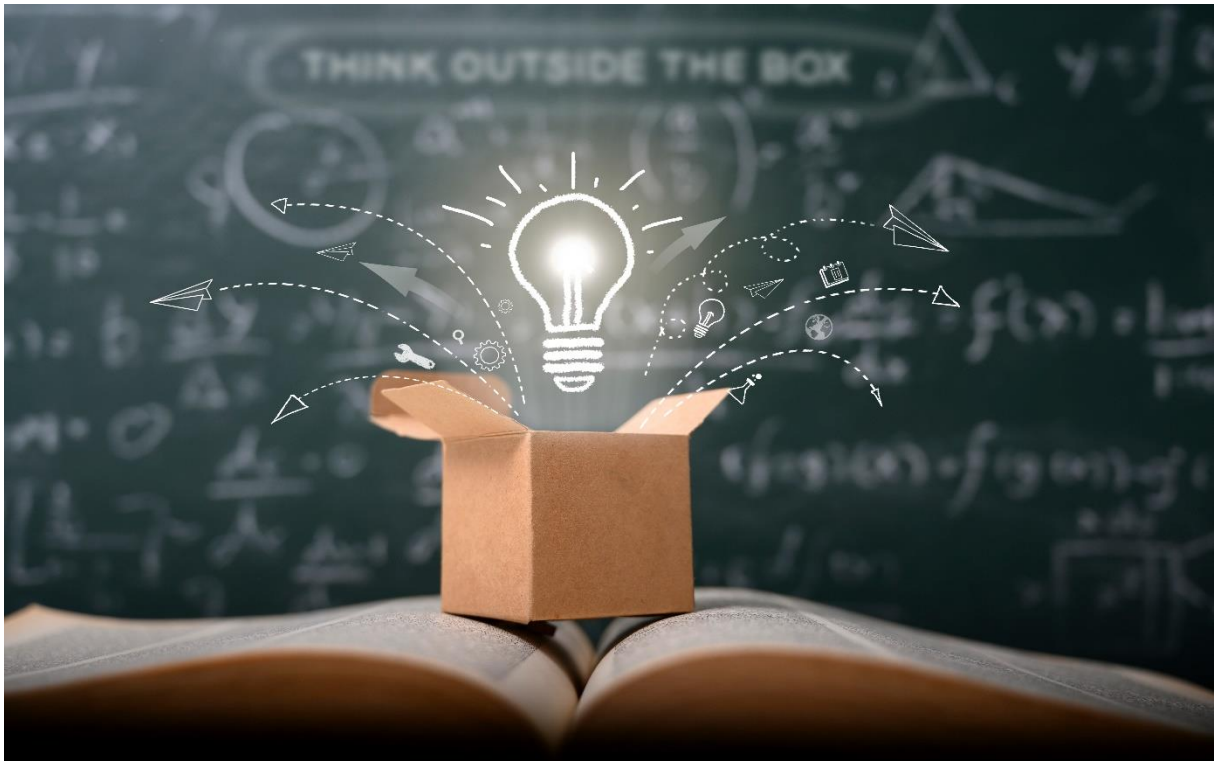
In order for the information contained here to be complementary, it is necessary to familiarize yourself with other safety content and supplemented by professional training as well as practical training.

The recommendations which are provided here must be compared with country regulation as each EU country could have specific law, best practices and regulations.

The Handbook supplement the binding provisions of the Grant Agreement 861643 — Mall-CBRN — ISFP-2018-AG-CT/ISFP-2018-AG-CT-PROTECT and Partnership Agreements signed by the Partners. In case of any conflicts between The Guidelines and the content of the Grant Agreement or Partnership Agreement, provisions of the Agreements shall prevail.

It contains:

- General information
- Description of CBRN detection and protection technologies, with a description of available analytical techniques and equipment which could be used to minimize effect of CBRN accident
- General, structural approach to minimize risk of CBRN accident as well as specific practical procedures for prevention and response to it
- Recommendation for an improvement of CBRN security



2. HANDBOOK GOALS AND TARGET AUDIENCE

2.1 Handbook goals

The goal of this handbook is to provide information relevant to different target audiences about threats coming from the use of chemical, biological, radiological and nuclear materials. The acquired knowledge is expected to enhance security level in shopping malls in case of malicious or unintentional release of CBRN agents. People at different positions in the organization should be trained and prepared for CBRN attack or accident. They have different knowledge, duties, obligations and of course decision power.

During study visits and meetings with end users representatives four target groups were identified as crucial for CBRN security and safety of malls:

- Technical staff
- Security
- Tenants
- Management

Division of duties, obligations and tasks could vary from one shopping mall operator to another. To better understand who should attend the training and which one, short description of each identified target group is provided.

2.2 Target audience

2.2.1. Technical staff

The technical service of the facility is most often carried out:

- through companies from the Facility Management (FM) industry that provide technical maintenance and maintenance services on a continuous basis
- through its own technical staff (employed directly by the Facility Manager or Owner) dedicated to a given property

The composition of the technical service most often results from the size and function of the shopping centre. In the case of large properties, it is usually a permanent team of several employees as a Facility Technician, Technical Service Manager and, of course, depending on the size of the facility, the Deputy Manager of the Technical Service or the Building Energy Engineer. If there is also a significant share of office space in the centre, there will also be solutions where part of the technical staff is mainly dedicated to servicing office tenants.

The personnel providing technical maintenance services have full knowledge of the functioning of the property, the operation of installations and the possibility of their control or modernization. In practice, these are the employees who are able to switch off or change the operating parameters of the main building installations as quickly as possible. In terms of the assumptions of the project, knowledge in the field of installation of the facility will be necessary to introduce and implement potential new scenarios from the definition of new threats. It is worth pointing out that the technical staff of the facility is in many cases included in a functional (supporting) way in the evacuation scenarios of the facility (described in the Facility Safety Instructions), often plays an advisory role for the managerial staff on operational and investment issues of the facility's life, as well as supports activities in emergency situations state authorities, such as the Police, during the search of the facility after receiving the message about the existing threat in the facility.

2.2.2. Security

Physical protection services are usually provided by specialized companies, including companies of international scope. In this case of the structure of the facility security, the most common gradation of positions is the Guard Officer (the so-called Tour Post), the Monitoring Operator, the Shift Commander and, for the largest facilities, the Head of the Facility Security. The number of Security Staff and thus also the functional structure in each facility is different due to its size, but also the surroundings and the specificity of the facility's location.

Facility security structures play a key role in the security of the centre. Security staff are obliged to constantly monitor the situation in the facility, report any irregularities or threats noticed and react immediately in the event of their occurrence. In the case of security structures, the key position is the Security Commander: the occupants this position stay in the facilities 24 hours a day, 7 days a week in shifts, supervise the implementation of the tasks of the inspection employees and, crucially, carry out the process of evacuating the facility in the event of a hazard. The role of the security staff is also the implementation of periodic security audits in the operated facilities and the advisory function for the managerial staff in the broadly understood security issues of the facility. On selected issues (e.g. related to security in the field of suspicious correspondence or parcels addressed directly to the administration of the shopping centre). Administration assistants and reception staff should be trained as they are the people, who in practice are the first in direct contact with courier or postal items.

2.2.3 Tenants

In commercial facilities, tenants will constitute the most diverse group of building users. Depending on the nature of the business, the personnel structures among the Tenants will be appropriately developed: starting from commercial stands located in the passages of the buildings, smaller premises where one person will often work in shifts, through large premises requiring the employment of at least several people during one shift, to on large and large premises with their own multi-stage gradation of teams of several dozen people.

Regardless of whether the analysis is carried out on premises where commercial activities are conducted, healthcare services, cinemas, fitness clubs or other types of activities in each case we will find a team leader among the staff, a manager who organizes the work of the staff and is responsible for the premises, including issues related to the evacuation of people in the premises (both customers and employees). It is the managers managing the premises who have the appropriate knowledge of who can be entrusted with cooperation in the internal structures in terms of security in a given facility.

2.2.4 Management

Facility management staff (i.e. Property Managers) may have different structures depending on the size of the facility and the business model of the property owner. Facility managers are people who take care of the functioning of the facility in the entire range of issues related to it. Structures on behalf of the Property Manager commission and supervise the work of all cooperating companies with the facility (of course, excluding service providers performing work for Tenants), including the two groups mentioned earlier, i.e. technical service and facility security.

The most common positions within Property Management are Shopping Centre Director and Technical Manager, depending on the size of the facility, the number of teams and the variety of tasks performed is obviously greater, we can indicate here such positions as Deputy Director of the Centre, Marketing Manager, Real Estate Specialists, Assistants and Reception Desk Employees of the Management of the Shopping Centre.

With regard to the assumptions of the project, it seems that the persons competent in the representation of subsequent facilities will be the Directors of the Centre and Technical Managers, these positions will combine security aspects of a formal/procedural nature with aspects of security implemented by hardware (i.e. using technology/installations). On selected issues (e.g. related to security in the field of suspicious correspondence or parcels addressed directly to the administration of the shopping centre) Administration managers need appropriate training.

3. THREATS

3.1 Threats description

Shopping malls are places where significant numbers of people gather in a small area, where the use of CBRN agents can bring potentially large numbers of victims as well as media publicity. Due to their specificity, they occupy a high position in terms of vulnerability to such attacks. Events in previous years show how crucial it is to anticipate and prepare for terrorist attacks in order to ensure the safety of their employees and customers. Visitors to SM in the European Union are not controlled in any way, and bringing a backpack or a bag of hazardous material is not a major problem. Terrorist threats have a very serious economic impact on the entire retail chain sector.

The consequences are felt not only by the facilities directly affected by the attacks, but also by the entire industry or a particular retail chain. Shopping malls are also places for business contacts and meetings due to the office spaces leased on their premises. The multinational nature of the services provided, the large media, and the large number of points vulnerable to attack make shopping malls places highly exposed to terrorist threats. Hence, there is a great need to meet the threats, to ensure that the procedures developed and implemented as well as the technical security elements of these facilities protect as effectively as possible against terrorist attacks using CBRN agents.

3.1.1 Intentional

Examples of intentional threats:

- the dispersion of CBRN agents in the form of gases, liquids, aerosols or solids in the air or on the ground by means of ammunition, explosives or other dispersal means (e.g., spraying devices), resulting in contamination over wide areas or in confined spaces
- use of CBRN agents in armed conflicts by means of specially constructed military weapons or improvised devices, with or without explosives
- use of CBRN agents to contaminate food or water on a small or large scale
- deliberate contamination with CBRN agents of individuals or groups, by mail, resulting in contamination of people and buildings (e.g., Bacillus anthracis spores)

3.1.2 Unintentional

Examples of unintentional threats:

- industrial accidents involving a release, fire or explosion in industrial plants or magazines that use hazardous substances in production/storage
- nuclear power plant accidents
- accidents at military research, production and storage facilities for chemical, biological or nuclear weapons
- armed conflicts in which a CBRN agent is released due to damage to installations of industrial plants, research and development, production or military facilities
- accidents during transportation of dangerous goods for industrial or military purposes
- natural outbreaks of human, animal or plant diseases
- natural disasters, such as an earthquake or tsunami
- contamination from previous incidents, such as industrial accident sites or from sites formerly used to manufacture, store or test CBRN weapons
- remnants of war, such a unexplode, abandoned CBRN weapons, or residual contamination caused by their use

3.2 Contamination methods

3.2.1 Direct exposure

Direct exposure to CBRN agents in the form of vapour, smoke, fine dust or aerosols can occur during or shortly after their release and dispersal through:

- inhalation of airborne material
- absorption through the skin, eyes or open wounds
- airborne re-suspension of CBRN agents that have settled on surfaces, especially in areas with pedestrian traffic, leading to prolonged exposure and thereby increasing the likelihood of a harmful/hazardous dose
- transfer of CBRN agents by contaminated persons or other means of transport from contaminated to uncontaminated areas, resulting in cross-contamination

In the specific case of nuclear and radiological threat, the penetrating nature of the emitted radiation may be such that exposure occurs without direct contact with the contaminants and a person may only be exposed by being in the vicinity.

3.2.2 Indirect exposure

Indirect exposure to CBRN agents once they have been released and dispersed can occur through:

- person-to-person transmission of CBRN agents through contact with contaminated clothing, objects and surfaces or through contact with the skin
- person-to-person transmission of the agent (contact disease)

3.3 Examples of CBRN attack and incidents

3.3.1 Terrorist attack with sarin in Tokyo

The attack on Tokyo subway was perpetrated on 20 March 1995 by members of the Japan cult movement called "Aum Shinrikyo" (AUM sect). In five attacks in three lines of Tokyo Metro terrorists released sarin, a nerve agent. Five perpetrators (each of them having dedicated getaway driver) had 2 or 3 plastic bags, having in total 0,9 to 1,3 litres of sarin each. Plastic bags were wrapped in newspapers. On predefined station bags were put on the train floor and then punctured with sharpened umbrella ending several times. After puncturing bags perpetrators left train and exited the station where their accomplices were waiting. One of perpetrators contaminated himself but in the waiting on him car there were antidote prepared. Sarin was leaking from bags and evaporated to the air. Victims inhaled vapours and soon after symptoms started.

Some people escaped from the trains themselves but many victims needed immediate medical care. So many people rushed to nearby hospitals, creating panic in hospital staff and they couldn't properly cope with victims. Typical symptoms include ocular pain, nausea, miosis, hyperaemia nose bleeds vomiting, darkened vision.

Attack happened during rush hours resulting in 13 fatal victims and approximately 5 000 people injured.

The AUM sect planned to spread sarin in aerosol form but finally decided to use simplified dispersion method. Thanks to this number of fatal casualties were relatively low. Toxicity of sarin is so high that about 0.5 g is enough to kill an adult person. If sarin had been delivered to victims in an aerosol form number of fatal casualties will be much higher (probably 100 times or more).

It was discovered later that the attack was not prepared very well due to the fact that head of the AUM sect was informed about planned on 22 March 1995 police action against the sect and himself. He decided to conduct the attack on 20 of March. Because of a hurry, lack of proper precursors, synthesis of sarin was not very successful resulting in poor quality of a product (sarin was half pure in comparison to the one used in Matsumoto attack several month earlier).

Figure 1: **Tokyo sarin attack**
Source: https://www.nbcnews.com/news/world/japan-executes-six-members-aum-shinrikyo-cult-behind-deadly-sarin-n894711 [Access:16.12.2022]

Probably hurrying an attack was also a reason why the sect resigned from more sophisticated method of delivery using sarin in an aerosol form. Emergency services were criticised because of their handling of the situation. Despite relatively fast identification of an agent (attack started at 8.00 am and results of chemical analysis were available at 10.00 am) cause of the incident was not immediately understood.

A lot of errors have happened:

- subway company allowed contaminated trains to operate
- one hospital refused to admit victims
- many hospitals turned victims away
- media people refused to transport victims to hospitals as they more interested in sensational situation
- many people from emergency services did not have any PPE so about 10% of injured people were from rescuers
- hospitals had no knowledge about diagnosis and treatment

3.3.2 Bhopal disaster

The Bhopal disaster was a chemical accident on the night between 2nd and 3rd of December 1984 at Union Carbide India Limited, pesticide plant located on Bhopal, India. This accident is considered as the worst industrial disaster but not very well known. The much better known disaster in Chernobyl caused directly up to 50 deaths and probably could be referred to additional 4000 deaths due to cancer cases as result of radiation, while in Bhopal number of fatal casualties vary from 3 787 and 16 000 additionally about 500 000 people were injured. Bhopal disaster is an example of a toxic effect of chemical on the people, in other disasters, especially in petrochemical industry, huge explosions are often effects of unwanted reaction or leakage and blast, fire and temperature are killing factors.

Probably as an effect of an attempt to unclog a storage container's side pipe water entered the storage tank. It started unwanted runaway exothermic reaction. As an effect of the reaction high temperature and high pressure caused crack of the tank and leakage of highly toxic gas methyl isocyanate (MIC) used for Carbaryl production (insecticide).

About 30 tonnes of MIC was released to the atmosphere in 1st hour and additional 10 tonnes within two hours.

The first symptoms of MIC poisoning were cough, eye irritation, suffocation, burning in the respiratory tract, breathlessness, stomach pain, vomiting. Directly after exposure thousands of people died mainly due to choking, reflexogenic circulatory collapse and pulmonary oedema.

Figure 2: **The Bhopal disaster**
Source: https://economictimes.indiatimes.com/news/politics-and-nation/bhopal-gas-tragedy-thirty-years-on-wounds-from-worlds-worst-chemical-industrial-disaster-yet-to-heal/articleshow/45398395.cms?from=mdr [Access15.12.2022]

MIC is twice as dense as air which leads to higher concentrations close to ground level. Thus shorter people and children were affected more than tall people.

Causes of the disaster

There were a lot of errors made before and after the accident which resulted in high number or victims, most of them were avoidable. The very first problem was location of the chemical plant – in the middle of the big city (population now is about 2 M) on the hill where MIC is known as a heavy gas which flows down the hill.

The second group of problem is very low technical condition of the chemical plant, a lot of valves, pipes, tanks, sensors were malfunctioning. Some safety systems like vent gas scrubbers or flare tower were out of service.

The third group of causes were low awareness level or low knowledge of the safety systems as well as neglecting safety procedures. For instance in the E610 tank there should be maximum 30 tonnes of MIC but at the day of accident there were 42 tonnes of it. Additionally flare tower should have been operated and, which is ridiculous, supervisor on duty' reaction to very first information of leakage (at 11.45 PM) was "come back with this after tea break" (which starts at 12.15 AM).

The last group of problem is company policy to block any information as long as possible which resulted in delayed 1.5 h public alarm (company's alarm was triggered soon after the leakage, when concertation of MIC gas was difficult to tolerate), refusing that anything happened and not supporting hospitals with at least the name of agent released. It is worth to mention that similar chemical plant was running at the time by Union Carbide in USA but safety measures and condition of the plant there were at much higher level than at the plant in India.

Figure 3: **Panel of victims photos**
Source: https://www.theatlantic.com/photo/2014/12/bhopal-the-worlds-worst-industrial-disaster-30-years-later/100864

3.3.3 The Goiânia accident

Contamination in Goiânia - a level five radiation emergency on the seven-level INES international scale. Radioactive contamination in central Brazil caused the injury of many people and even death of few of them and extensive cleaning procedure. On September 13, 1987, an abandoned hospital in the city of Goiania, the capital of the state of Goias, was entered by scrap metal pickers who removed and sold the metal parts of the radiotherapy device at the scrap yard.

The authorities knew about the threat and the hospital was secured, however, on that fateful day, the security guard did not show up for work. have the first symptoms - vomiting.

Figure 4: **The radioactive source involved in the Goiania accident**
Source: https://en.wikipedia.org/wiki/Goiânia_accident [Access: 19.12.2022]

Taking advantage of the lack of protection, two scrap collectors broke into the hospital and partially dismantled the radiotherapy device and then transported it in a wheelbarrow to the house of one of them. They began to disassemble the device. On the same day, they began to have the first symptoms - vomiting.

On September 16, one of them managed to break through the window of the container containing the radiation source, Cs-137, in the form of caesium chloride. This powder emitted a deep blue light which caused great interest among the local community.

The owner of the junkyard, delighted with this glowing material, which he considered very valuable or even magical, invited many people to watch it. He distributed some of the material in the form of granules and sold the rest. His wife became suspicious that suddenly many people in contact with this powder became ill and unwell, took the remaining material (10% of the original amount of material) to the hospital where the hazard was identified.

Figure 5: **Cs-137 source used for radiotherapy, the same as the one used in Goiania hospital chloride**
Source: https://deadheadingcrew.tumblr.com/post/186489270389/the-goiânia-accident [Access:19.12.202]

Effect of the contamination was huge, 112,000 people were tested, 250 had significant level of the radioactive material in or on their body, 129 had internal contamination, 4 people died. Due to dispersion of the material difficult, costly clean-up procedure had to be applied.

Figure 6: **Glowing caesium chloride**
Source: https://deadheadingcrew.tumblr.com/post/186489270389/the-goiânia-accident [Access:19.12.202]

Figure 7: **Wagner Mota Pereira (one of two scrap metal prospectors) hands after exposure – few fingers had to be amputated**
Source: https://deadheadingcrew.tumblr.com/post/186489270389/the-goiânia-accident [Access:19.12.202]

As part of the cleaning, paint was removed from the walls, floors and walls were vacuumed to remove caesium chloride dust. Attempts have been made to wash contaminated surfaces with water but also to use Prussian blue salt to complex caesium. In addition, the surface layer of the earth was removed, several buildings were demolished, and the roofs of two houses had to be removed. Removal of the contamination was difficult due to the fact that the source was open and the caesium compound used is water soluble.

3.3.4 Assassination of Alexander Litvinenko

Alexander Litvinenko, a former KGB and FSB agent, was a well-known Russian opposition figure who spoke out against Russian policy, mainly in relation to Chechnya. His actions prompted him to leave Russia, he moved to the United Kingdom, where he was granted political asylum. During his stay in the UK, he exposed the illegal activities of the FSB.

In 2006, he investigated the death of Anna Politkovskaya, a journalist critical of the Kremlin. On November 1, 2006, he suddenly felt bad, he was hospitalized in a serious condition, from which he left after a few days. However, due to the deterioration of his health, he was hospitalized again. Initially, it was suspected that the cause of Litvinenko's illness was an infection, food poisoning or thallium. As a result of the disease, he died after 23 days. Scotland Yard investigated Litvinenko's poisoning, and on November 24 it was revealed that not thallium was found in his body, but the highly radioactive and toxic isotope polonium 210.

Figure 8: **Alexander Litvinenko before and after polonium poisoning**
Source: https://www.leparisien.fr/international/novitchok-polonium-dioxine-ces-poisons-qui-visent-les-ennemis-du-kremlin-16-03-2018-7612329.php. [Access: 16.12.2022]

It was served to him in tea during a social event in one of the London hotels where his former friend from the FSB Andrei Lugovoi was present.

In 2016, a British intelligence report was published in which the former head of the FSB Nikolai Patrushev and President Vladimir Putin himself were accused of ordering Litvinenko. Litvinenko symptoms are considered consistent with administered activity about 2 GBq (50 mCi) which corresponds to 10 micrograms of ^{210}Po[2] which is 200 times higher than median lethal dose – LD50).

Polonium-210 decays to ^{206}Pb, stable lead isotope. By measuring the proportion of polonium to lead date of production could be established. Apart of that the analysis of impurities in the polonium allows identification of the place of production (impurities vary from one production site to another). By those measurement it was discovered that polonium used for Litvinenko poisoning was produced in Avangard facility in Sarov, Russia. Probably FSB lab was involved into transition polonium from solid form (metal) to liquid which was used.

[2]Nathwani, Amit C (2016). "Polonium-210 poisoning: a first-hand account". The Lancet. 388: 1075–1080. doi:10.1016/S0140-6736(16)00144-6

3.3.5 Other examples of RN cases

Tammiku stolen source, 1994[3]

Three brothers broke into an Estonian radioactive waste disposal site in 1994, where they were looking for scrap metal to sell. Apart from scrap metal, they unintentionally have stolen highly active radioactive source. Also during this heist, one of the thief has been injured in his leg.

As the result of this illegal action all three wrongdoers have been irradiated. One of them took the radioactive source home, placed in a drawer in the kitchen and in that way he unintentionally irradiated his whole family and puppy, which died a few days after. Only this one brother died, but the cause of his death was not associated at that time with radiation exposure.

Zheleznodorozhny criminal radiological act, 1995[4]

One of the criminal acts has its place in Russia in 1995. An unnamed truck driver was killed by five months of radiation exposure to a 48 GBq caesium-137 source. This source had been put into the door of his truck around February 1995.

He had been exposed to gamma radiation for 5 months before the source was found. As a result of the irradiation, the man got sick and died of radiation-induced leukemia on 27 April 1997.

Mirkow incident, 2022[5]

The alarm from a radiation portal monitoring system was activated at the metal scrap yard in Dabrowa Gornicza, in February 2022. The alarm was triggered by a courier parcel. During the investigation it turned out that two boys dismantled an apparatus containing radioactive source (about which they had not known before), which they obtained from their neighbour.

The shielding of the radioactive source has been damaged and radioactive material has been spread around. As a consequence these two boys obtained dose ~200 mSv every of each and decontamination action, of whole village where they live, took a few months.

[3]http://www.johnstonsarchive.net/nuclear/radevents/1994EST1.html
[4]http://www.johnstonsarchive.net/nuclear/radevents/1994EST1.html
[5]https://wwwnews.iaea.org/ErfView.aspx?mId=2aa922e5-15fd-4e0f-b87d-6ba3dd3c1607

3.3.6 Rajneesh sect bioterror attack in 1984

One of the largest bioterrorist attacks carried out in the US was Salmonella typhimurium contamination of food from 10 salad bars in The Dalles, Oregon in 1984. The attack was performed by Bhagwan Shree Rajneesh's religious group.

The attack was aimed at taking power in local administrative structures by changing the results of the local government elections (it was hoped that sick residents would not participate in the elections). It should be noted that the relations between the local community and the sect's followers living in the nearby commune were extremely tense. Although there were no fatalities as a result of the attack, 751 residents fell ill, of whom 45 were hospitalized.
Initially, the epidemic investigation did not reveal intentional food contamination.

The sect's involvement was confirmed a year later after samples of the bacteria used in the attack were found in their laboratory. Two high-ranking members of the group were convicted, but Rajneesh's involvement in the incident was not proven.

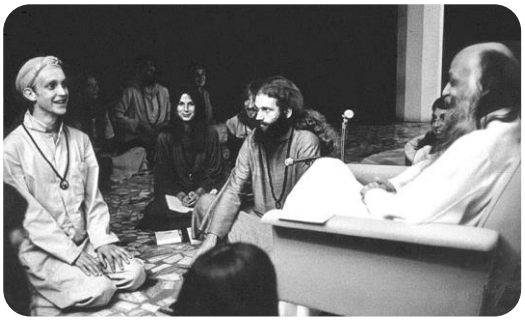


Figure 9: **Bhagwan Shree Rajneesh and his followers. Image by Redheylin**
Source: https://en.wikipedia.org/wiki/File:Bhagwan_Shree_Rajneesh_and_disciples_in_darshan_at_Poona_in_1977.jpg. [Access: 15.12.2022]

Figure 10: **Restaurants in Dallas attacked by the Rajneeshee group in 1984**
Source: https://commons.wikimedia.org/wiki/File:DallesRestaurantsCombined.jpg. [Access: 15.12.2022]

3.3.7 Amerithrax (Antrax letters) in 2001

The threat of a biological attack by terrorists in the United States increased significantly after the attacks on the World Trade Centre on September 11, 2001.

In the fall of 2001, letters containing anthrax spores (Bacillus anthracis) were sent to media agencies and two Democratic senators, resulting in the death of five people and the infection of at least 17 people. It also resulted in the closure of numerous contaminated facilities, including the Supreme Court building, congressional offices, post offices, among others.

The attack took place in two waves, in the first on September 18, letters were sent to 5 media: ABC News, CBS News, NBC News, the New York Post and the National Enquirer tabloid owned by American Media Inc. (AMI). Interestingly, only two of these packages were found, the existence of the other three letters was inferred from the fact that employees of ABC, CBS and AMI were infected with anthrax.

Figure 11: **Amerithrax envelope addressed to Senator Thomas Daschle, postmarked October 9, 2001**
Source:
https://multimedia.fbi.gov/original/3306 [Access:15.12.2022]

Robert Stevens, a press photographer of The Sun newspaper (AMI concern), was the first to die. The second wave of attacks came on October 9, 2001, when two letters were sent to Tom Daschle, the Democratic Senate Majority Leader, and Patrick Leahy, who was then chairman of the Senate Judiciary Committee. The letters also contained messages intended to give the impression that the attack was related to the activities of Islamic extremists.

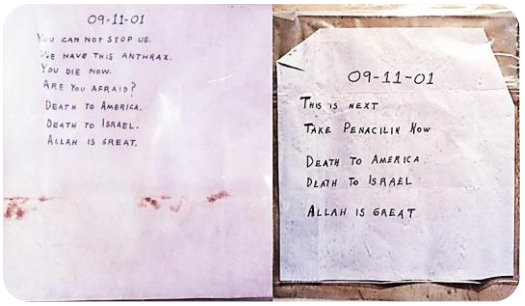


Figure 12: **Anthrax letters Image by FBI**
Source:
https://multimedia.fbi.gov/item? type=image&id=2078; https://multimedia.fbi.gov/item?type=image&id=896. [Access: 15.12.2022]

The epidemic investigation found that the first letters sent contained a rough granular brown material and was associated with the cutaneous form of anthrax, while the letters to senators contained a highly purified white powder that caused much more serious symptoms - the pulmonary form. Although the anthrax-containing substances had two different forms and grades, the biological material came from the same strain, known as the Ames.

The letter to Senator Daschle was posted at the Brentwood post office, two of whose employees died a few days later from pneumonic anthrax.

Figure 13: **Bruce Ivins**
Source: https://https://edition.cnn.com/2009/CRIME/01/06/anthrax.ivins/. Access: 15.12.2022]

The disease also occurred among employees of the post office in Washington, through which the correspondence was sent to the Capitol, and later also employees of the post office in New York.

Authorities launched an unprecedented investigation, officially completed in 2010, which identified Bruce Ivins a leading anthrax researcher at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), as the alleged perpetrator. Nevertheless, Ivins has never been officially charged as he committed suicide in 2008 taking a lethal dose of the painkiller Tylenol after being informed of his planned indictment. The bioattacks carried out had very large economic consequences.

Several buildings were contaminated with anthrax, decontamination of Brentwood mail took 26 months and cost $130 million. The Hamilton post office in New York was closed until March 2005, and its decontamination cost $65 million. Decontaminating government buildings in Washington cost $41.7 million. Some FBI documents suggest that overall damages are estimated at more than $1 billion. In addition, these events had a global effect, as they intensified a huge panic and a decrease in the sense of security not only in the United States, but also in most countries of Western civilization.

3.3.8 Attack on supermarkets in London

On August 25, 2021, a series of blood (initially an unknown liquid substance) injections from syringes into food products took place in three London supermarkets - Tesco Express, Little Waitrose and Sainsbury's Local.

Leoaai Elghareeb, a solicitor, went to three shops located on Fulham Palace Road in West London.

He had dozens of syringes with him, which contained blood. After entering each market, he injected their contents into food products, including apples, bacon and chicken fillets.

Additionally, he attacked a man present in one of the stores with one of the syringes, and also got into a scuffle with a security guard and threw empty syringes at people outside. All these events were captured by CCTV cameras. Interestingly, due to insanity, the British court acquitted Elghareeb.

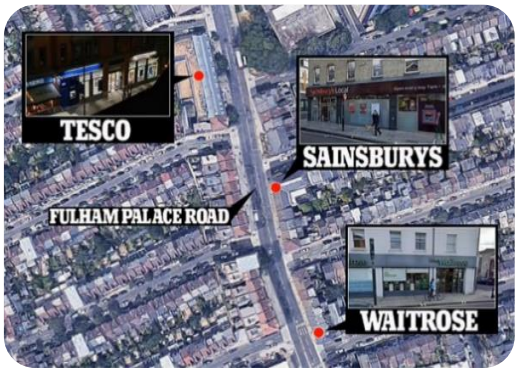


Figure 14: **The three supermarkets on Fulham Park Road**
Source: https://www.dailymail.co.uk/news/article-10786377/Lawyer-injected-blood-supermarket-food-not-guilty-insanity.html. [Access: 16.12.2022]

Altogether, he has caused losses totalling up to £500,000 in decontaminating stores and disposing of contaminated products. Waitrose's costs were estimated at £207,000, Sainsbury's at £143,000 and Tesco at £117,000.

Figure 15: **CCTV image of Leoaai Elghareeb sticking syringes into food products**
Source: https://uk.news.yahoo.com/leoaai-elghareeb-injects-blood-supermarket-food-bizarre-rampage083738046.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referr

3.4 CBRN definition and description of agents

3.4.1 CBRN definition

CBRN is the abbreviation used to describe effects the use of Chemical, Biological, Radiological and Nuclear materials or weapons. The hazard posed by these materials are:

- Chemical: Poisoning or injury caused by chemical substances, including traditional (military) chemical warfare agents, harmful industrial or household chemicals
- Biological: Illnesses caused by the deliberate release of dangerous bacteria or viruses or biological toxins (e.g. ricin, found in castor oil beans)
- Radiological: Illness caused by exposure to harmful radioactive materials
- Nuclear: Life-threatening health effects caused by exposure to harmful radiation, thermal or blast effects arising from a nuclear detonation

3.4.2 Chemical agents

Threats coming from chemical substances could be divided into two groups, the first group consist of chemicals having military potential, the second group, much bigger and more difficult to classify, contains chemicals used in the industry.

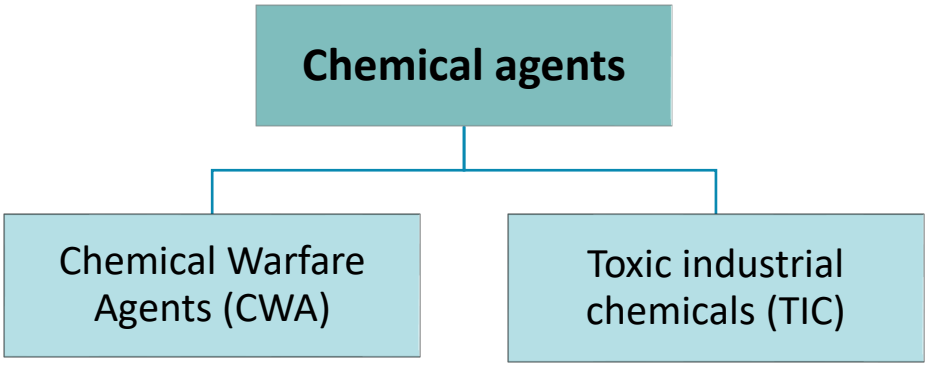


Figure 16: **Categorisation of chemical agents**
Source: https://www.dailymail.co.uk/news/article-10786377/Lawyer-injected-blood-supermarket-food-not-guilty-insanity.html. [Access: 16.12.2022]

3.4.2.1 Chemical warfare agents

Chemical warfare agents could be classified by different categories, for instance based on volatility, persistency, physical state etc. The most important and well established classification of CWA is based on effect on humans.

We recognize:

- Nerve agents
- Vesicants
- Blood agents
- Choking agents
- Riot control agents
- Psychomimetic agents
- Toxins

Short characteristic of CWA categories is presented below. More precise information of the most important CWA are presented in Appendix I.

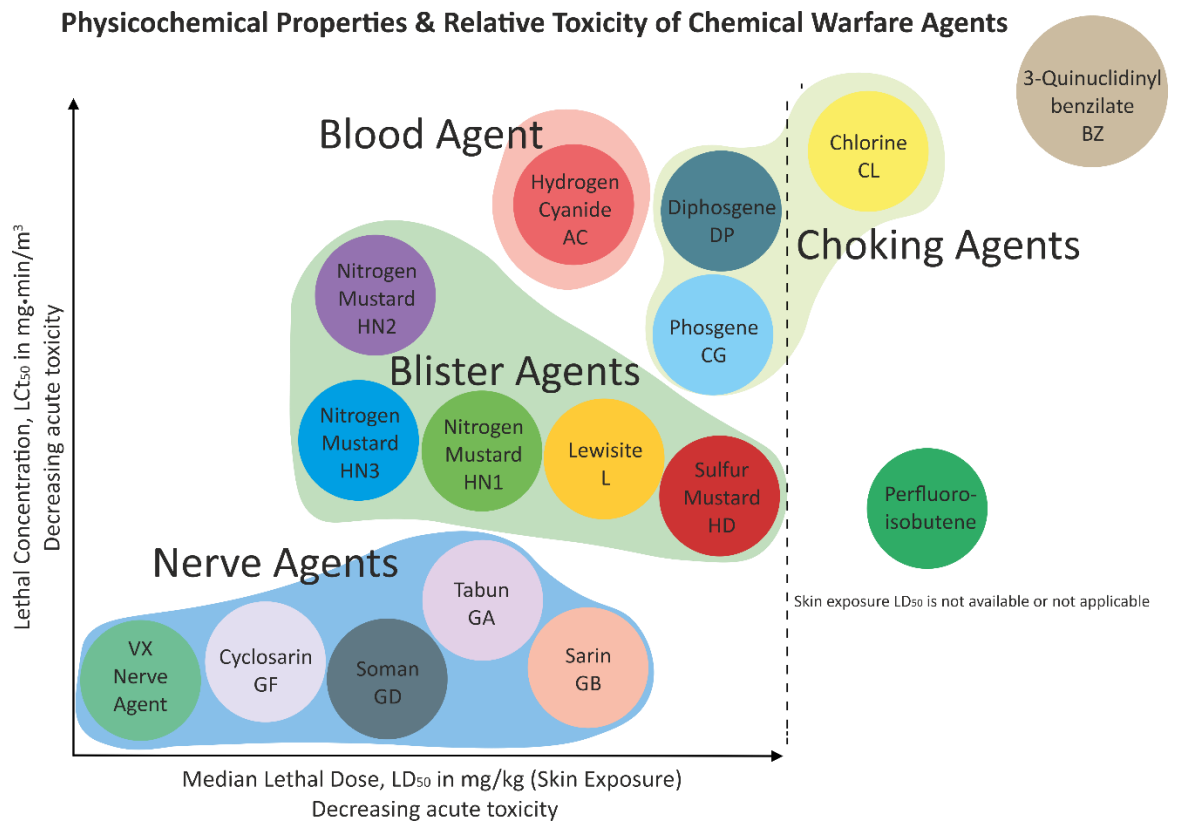


Figure 17:**Relative toxicity of chemical warfare agents**
Source: based on
https://www.opcw.org/sites/default/files/documents/Science_Technology/Visual_Guide_to_OPCW_Science_and_Technology.pdf

Nerve agents

Nerve agents are named for their effect of the functioning of nervous system. They belong to organophosphorus group of organic compounds. Nerve agents are considered as the most toxic CWA. They could cause death from minutes to hours after exposure – depending on the concentration. First known nerve agent, Tabun, was developed by German scientist Gerhard Schrader in 1930s. Tabun started family of organophosphorus CWAs known as G-agents. This series include tabun (GA), sarin (GB), soman (GD) and others.

Another group of nerve agents is called V-series and include VX, VXR which are more stable, less volatile, less water soluble more toxic and could stay in environment much longer then G-agents.

The primary mechanism of action is inhibition of the enzyme acetylcholine-sterase (AChE) at the neuromuscular junction. Acetylcholine has an important role on stimulation of muscles – it is transferring stimulation signals between cells, AChE decomposes acetylcholine after stimulation happens. Due to inhibition of AChE there is excessive accumulation of neuro-transmitter acetylcholine. The result is overstimulation of muscles resulting in muscle paralysis. Affected human dies because of paralysis of lung muscles and suffocation.

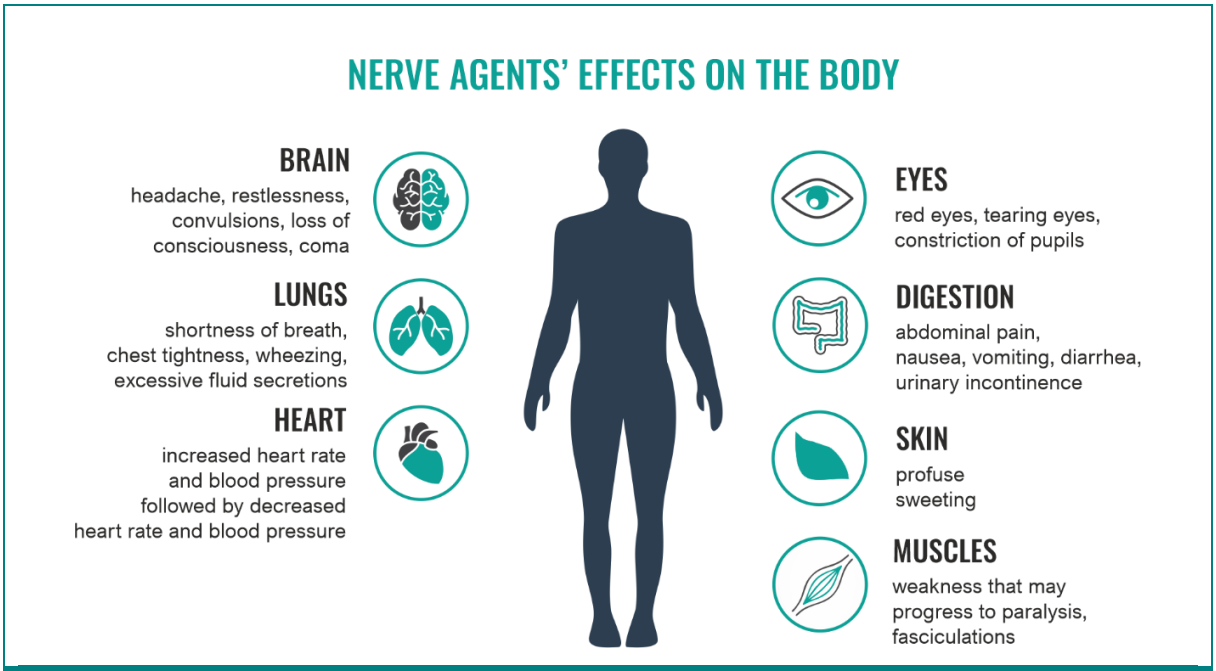


Figure 18: **Nerve agent's effect on the body**
Source:
https://share.america.gov/what-are-nerve-agents-and-why-are-they-so-deadly/
graphics based on - Adobe Stock #157124293

Vesicants

Vesicants or blistering agents are toxic compounds which produce skin injuries resembling burns.

Figure 19: **Mustard gas blisters**
Source:
https://en.wikipedia.org/wiki/Mustard_gas [access: 06.06.2023]

When inhaled they could destroy upper respiratory tract as well as the lungs resulting in pulmonary oedema. They also could cause severe eye injuries.

Two groups of blistering agents: mustards and arsenicals.

The first group consist of the well-known mustard gas, (HD) or yperite (because of the place of first military use) and also nitrogen mustards (HN1, HN2, HN3).

Mustard gas has no odour when pure, but its impure form has a specific smell of mustard or horseradish. Nitrogen mustard have fishy odour (HN1 and HN3) whereas higher concentrations of HN2 smell fruity.

The second group of vesicants consist of Lewsites (L1, L2, L3). They have geranium like odour.

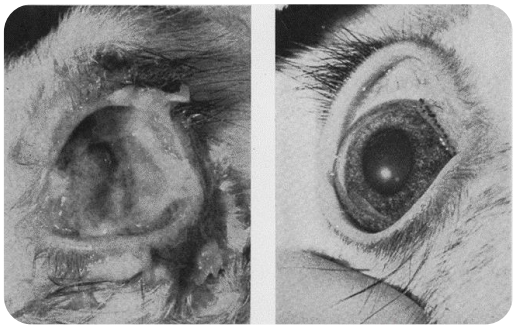


Figure 20: **Effect on lewisite on eyes without (left) and with treatment with BAL (right) after 4 days of exposure**
Source:
CIINICAL USES OF 2,3-DIMERCAPTOPROPANOL (BAL). IX. THE TREATMENT OF LEWISITE BURNS OF THE EYE WITH BAL 1 By WILLIAM F. HUGHES, JR. (From the Johns Hopkins University School of Medicine, Baltimore), (Received for publication February 5, 1946)

Blistering agents attacks DNA or other biological molecules like nucleic acids, proteins or peptides. Mustard agents could destroy a large number of different substances in cells by alkylation.

Blood agents

Blood agents are chemicals which are distributed by blood and they inhibit the ability of blood cells to transfer oxygen. It means that process of transport of oxygen from lungs to cells are reduced.

Exposure to low concentrations of blood agents causes weakness, giddiness, headache, confusion sometimes nausea and vomiting.

The most known use of hydrogen cyanide (AC) were gas chambers used by Germans to commit mass murder during WWII.
If the blood agents concentration is high enough transport of oxygen is stopped and human dies due to suffocation.

Very high concentrations of blood agents, like AC or cyanogen chloride (CK) could cause severe toxic effects in seconds or even rapid death.

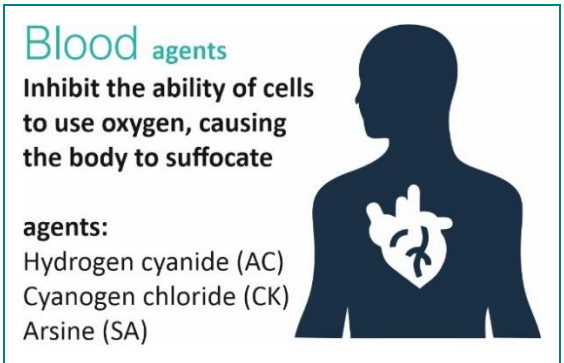


Figure 21: **Blood agents**
Source: https://www.aljazeera.com/news/2021/4/29/visualising-chemical-weapon-attacks-in-the-middle-east [Access 09.02.2023]

Choking agents

Choking or pulmonary agents are chemicals designed to disturb victim's ability to breathe. Those agents affect the respiratory tract- nose, throat airways and lungs. They operate by building-up of fluids in the lungs, which blocks oxygen exchange and leads to suffocation. Those agents are corrosive and could cause blurred vision and severe eye burns. Inhalation could cause burning of the throat, coughing, vomiting, headache, pain in chest, tightness in chest, and respiratory and circulatory failure. The most known choking agents are phosgene (CG), diphosgene (DP), chlorine. Those chemicals are widely used in industry thus it is difficult to control them. Because of differences in the structure of choking agents mechanism of action is different but generally they destroy certain tissue elements in airways and lungs particularly.

The most dangerous choking agent is phosgene because it is widely used in many chemical processes. It has odour of hay or cut grass.

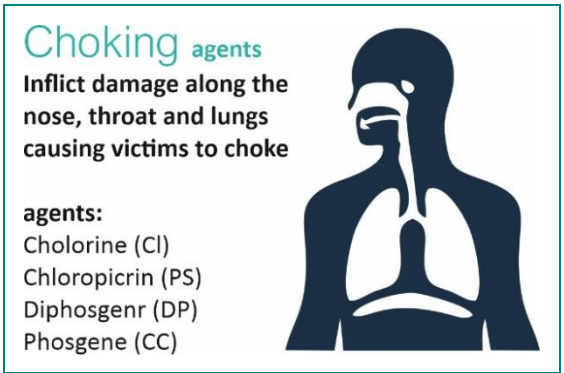


Figure 22: **Choking agents**
Source: https://www.aljazeera.com/news/2021/4/29/visualising-chemical-weapon-attacks-in-the-middle-east [Access 09.02.2023]

Riot-control agents

Riot control agents or irritating agents (sometimes cold "tear gases") are chemical compounds that temporarily make people unable to function by causing irritation to the eyes, mouth, throat, lungs and skin. According to the OPCW its use is prohibited in military actions (allowed only for training purposes) but could be used for domestic law enforcement.

This group consist of chemicals known as CS, CR, CN.

For each of the acute symptoms of pain, the probable mode of action is a direct chemical attack on sensory receptors in the skin and mucosa.[6]

Figure 23: **Use of riot control agents by US Police**
Source: https://www.mercurynews.com/2020/07/28/source-white-house-oregon-in-talks-about-pulling-agents/] [Access: 09.2.2023]

Psychomimetic (Incapacitating) agents

Psychomimetic or psychological agents are chemicals that generates changes in thought, perception and mood without causing any major disturbances in the nervous system or other serious disability. Those substances could cause effects similar to psychologic disorder or damage to central nervous system.

The common signs and symptoms produced by the psychomimetic agents are:

- restlessness, dizziness or giddiness; failure to obey orders, confusion, erratic behaviour; stumbling or staggering; vomiting
- dryness of mouth, tachycardia at rest, elevated temperature, flushing of face; blurred vision, pupillary dilation; slurred or non-sensical speech; hallucinatory behaviour; disrobing; mumbling and picking behaviour; stupor and coma
- inappropriate smiling or laughter, irrational fear, distractibility, difficulty expressing self, perceptual distortions and phobias

This group consists of BZ, LSD25, Phencyclidine (SN).

[6] CBRN Security manager Handbook

Toxins

Toxins are group of agents laying between chemical and biological weapon. This group consists of substances produced by living organism such as bacteria, fungi, terrestrial or marine animals[7].

There are two groups of toxins:

- Protein toxins – consisting of long folded chains of amino acids,
- Non-protein toxins – generally much smaller molecules with complex chemical nature.

The most dangerous toxins are neurotoxins (which are similar to classical chemical weapon – due to the fact that nerve system could be disturbed with very small amounts of substances).

Botulinum toxin is the most toxic agent known. The lethal dose for humans is lower than 1 µg per person, which means that if aerosolized 1 g of botulinum toxin could kill more than 1 million people. Mechanism of action is blocking release of AChE from cholinergic nerves of human nervous system.

Another examples of toxins are tetanum toxin, ricin, abrin.

The most important CWAs are described precisely in Appendix I.

3.4.2.2 Toxic industrial chemicals

Toxic industrial chemicals covers variety of chemicals which are used in the industry and could have a significant impact on humans health if released to air or water.

Those chemicals are generally less toxic than CWA, especially nerve agents, or they chemical or physical properties making them not usable for military purposes. On the other hand if there is a large amount of toxic substance why not to use it? This is one of the possible military scenarios with TICs – to destroy storage containers of toxic chemicals creating release of it and possible heavy losses.

One of the example is ammonia which is often used as cooling gas for refrigerators especially big ones often used in food industry. If military can do it during a war probably terrorist could also do it as well.

There are 40 000 to 60 000 chemicals used in world industry. They are transported by different means and control of the transportation of them is very challenging.

During transportation some problem could happen including road accident, pipeline leakage or taking control over the lorry with toxic chemical.

[77] Chemical warfare agents K. Ganesan, S. K. Raza, and R. Vijayaraghavan

Due to large quantities of chemicals and relatively easy access to them TICs are more probable agents to be used during terrorist attack then CWAs.

Classification of TICs is very difficult because there is a lot of them and have different structure, different toxicity they exist in different states etc. One of the most widely approach ids to use hazard index to classify TICs.

Table 1: **Hazard index classification**
Source:
CBRN. Security Manager Handbook (ISBN:978-83-8142-184-3

Toxicity (IDLG in ppm)	Index	State (Vapor Pressure in mmHg)	Index	Distribution[a]	Index	Number of Producers	Index
<1	5	Gas	5	5/6	5	>100	5
1 to 10	4	Liquid: >400	4	4	4	50 to 99	4
11 to 100	3	Liquid: 100 to >400	3	3	3	25 to 49	3
101 to 500	2	Liquid: 10 to <100	2	2	2	5 to 24	2
>500	1	Liquid: <10	1	1	1	<5	1

[a]Number of continents in which production occurs.

Hazard index is calculated by multiplication of indexes (Toxicity index, State index, Distribution index and number of producers index). Each index could have a value from 1 to 5 so the Hazard index can have a value from 1 to 625. Chemicals having HI ≥ 90 are considered as high risk chemical, while HI ≤36 are considered low risk chemicals. The biggest industrial disaster ever happened in Bhopal, India, where 40 tonnes of methylisocyanate were released killing about 4 000 people. This substance belongs to moderate risk chemicals. It shows that this classification describes only global risks related with particular chemicals.

The most important TICs are described in Appendix I.

3.4.3 Bio agents

Biological agents, due to their potentially very severe consequences, seems to be one of the most dangerous agents that could be used in terrorist attack.

Its use may pose a threat not only to the health and life of the population, but also to the environment.

The effects of its use may be as drastic as the effects of the use of nuclear agents.

Biological agents are pathogenic micro-organisms (viruses, bacteria, rickettsia, protozoa), as well as toxins that cause disease epidemics among humans, animals and plants.

The consequences of a bioterrorist attack bring not only human losses, but also huge economic costs.

Financial losses are related, on the one hand, to the exclusion of the building from operation and the need to decontaminate it, and, on the other hand, to the social aspect.

The social costs of bioattack are associated with the loss of reputation resulting in a reduction in the number of customers.

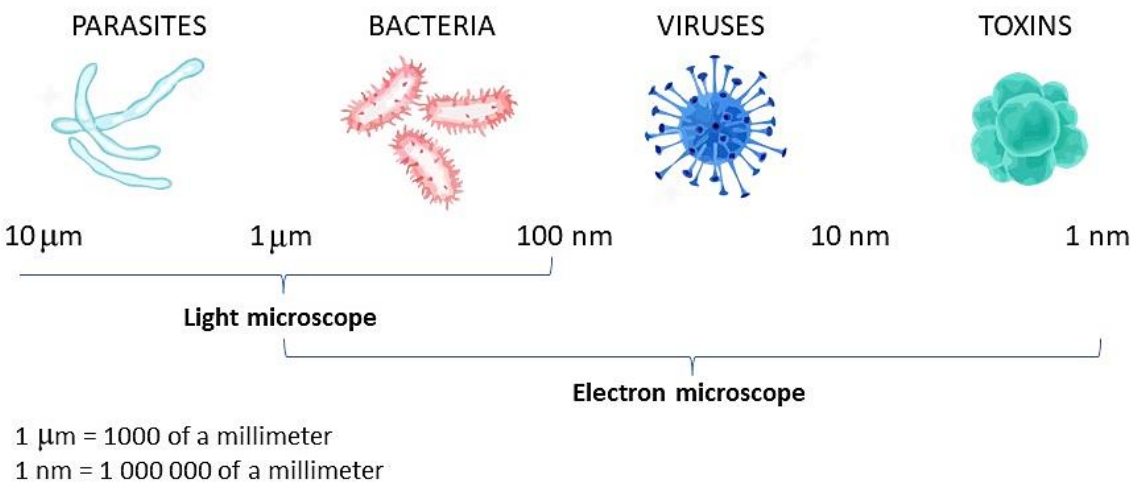


Figure 24: **Biological agents**
Source:
CBRN. Security Manager Handbook (ISBN:978-83-8142-184-3)

Costs of decontaminating stores and disposing of contaminated products after the bioattack on London markets in 2021:

- Waitrose's - £207,000
- Sainsbury's £143,000
- Tesco at £117,000

Currently known biological agents can enter into the human body through the respiratory system, digestive tract, and open wounds.

Penetration by inhalation leads to respiratory infections and poisoning with toxins.

Mass infections via this route may occur as a result of an attack carried out: in the open air (affects the effectiveness of the attack depending on many environmental and atmospheric factors), in partially closed areas (e.g., on the subway) and in closed rooms (e.g. shopping mall through ventilation which seems to be very effective).

However, penetration through the digestive tract caused by i.e., contaminated food or water, leads to poisoning and infections of the digestive system.

Infection may occur as a result of consumption of unboiled water, unfortunate swallowing during bathing in contaminated water of lakes, rivers or swimming pools. Due to consumption of improperly prepared food, especially without subjecting the meat to proper thermal processing and infected fruits and vegetables.

In turn, penetration through open wounds may be associated with the penetration of the pathogenic agent into the blood and then into the entire body.

The use of pathogens and toxins to fight the enemy was already known in antiquity. Food was poisoned with ergot, water with black hellebore, while poisoned arrows were shot at people, and the corpses of the dead of the plague were thrown to the defenders of cities. Such actions were supposed to cause infectious diseases among the defenders and thus weaken their forces. Currently, biological weapons are officially withdrawn from the means of warfare due to the ratification by many countries of the Convention on the Prohibition of Biological Weapons. Nevertheless, biological agents are still attractive to terrorists, even though the most dangerous pathogens (e.g. Ebola virus, smallpox virus, etc.) are mostly unavailable. The beginnings of bioterrorism date back to 1972, but many of the attacks were neutralized by the services or turned out to be ineffective.

Due to their physicochemical characteristics, biological agents are difficult to detect at the time of the attack. The fine-dispersion aerosol spraying method is the most effective, due to the possibility of its penetration deep into the lungs. What is more, spraying method is not difficult to perform. Biological agents are very dangerous because even small doses are capable to infect. Moreover, they are characterized by high virulence, contagiousness, and a very high mortality rate, for the most virulent pathogens it is about 90%. In addition, biological toxins have (compared to chemical agents) very low LD50 values, which makes them very hazardous for humans.

What's more, biological agents are easy to hide as they are odourless and colourless. In the case of an attack, the first symptoms are atypical and may take some time to appear, which further hinders the identification of the attack site and facilitates the spread of the agent.

Biological agents are characterized by ease of dissemination and the ability to survive in an unfavourable environment. They can be transported over long distances by wind, contaminated people, animals or objects without losing their original properties.

As a result, the contamination zone becomes larger and more difficult to determine.

The production costs of biological agents are extremely low and for this reason they are known as the "**weapon of the poor**".

The Centre for Disease Control and Prevention (CDC) has compiled a list of more than 40 biological agents that are considered as potential agents of mass destruction and has divided them into three categories A, B, and C:

- Category A includes agents that pose the greatest safety risk, as they can be transferred between individuals and cause secondary contamination. They have a high fatality rate, and their use can cause mass panic
- Category B, on the other hand, includes factors that are moderately easy to disseminate, causing moderate morbidity rates and low mortality rates but requiring specific strategies for diagnosing and monitoring the course of infection
- Category C includes agents that have the potential to be turned into weapons of mass destruction. They are available, easy to produce and distribute

The range of biological agents that can be used in bioterrorism is very large and includes pathogens that cause severe and fatal infections within weeks or even days, as well as biological toxins that usually attack both humans and animals, and their main target there is an attack on the nervous system, but depending on the type of toxin, different effects can be observed.

Some types cause death within a few hours, others after 72 hours, while others can only cause severe poisoning.

Among the signals that may indicate the possibility of using biological agents and contribute to the diagnosis of a disease caused by a pathogen, there is an appearance of atypical disease symptoms within the population, including changes on the skin and mucous membranes, symptoms of nervous system disorder, digestive system or multi-system damage.

Figure 25: **Ptosis of the eyelids in botulism, symptoms of poisoning may occur after a period of 2 hours to 8 days**
Source: https://cnx.org/contents/RCPG9uqx@4/Images-of-Memorable-Cases-Case-38. [Access: 19.12.2022]

In addition, a sudden, unexpected increase in morbidity and mortality due to unknown diseases, in particular, the observation of the ineffectiveness of treatment in the routine common diseases, as well as the appearance of cases in an unusual season and geographical area.

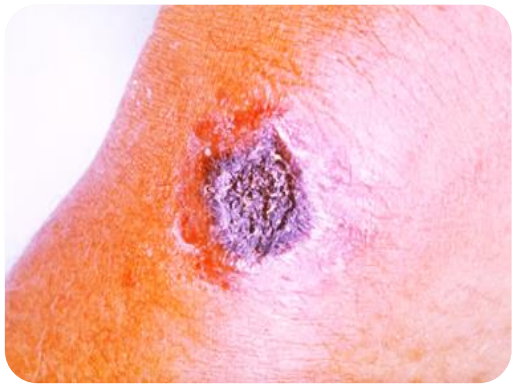


Figure 26: **Anthrax skin lesion**
Source:
https://phil.cdc.gov/details.aspx?pid=2033,
[Access: 15.12.2022]

In the event of alarming disease symptoms that may indicate the use of a biological warfare agent, actions are taken to determine the outbreak of the epidemic. Such activities are referred as epidemiological investigations.

Epidemiological effects of illegal use of biological agents can be divided into two general aspects.

The first one indicate the effects of direct action on people, including mass cases of serious infectious diseases, mass toxemias, mass mental injuries.

The second aspect present an indirect action, through infection/contamination of animals and plants as sources of food and drinking water, or which can also cause zoonotic diseases.

Figure 27: **Necrosis of the hand in the course of plague infection**
Source:
https://phil.cdc.gov/details.aspx?pid=4137,
[Access: 15.12.2022]

A wide range of biological agents have been developed as weapons in military biological weapons programmes. Bacterial agents include those causing anthrax, plague, tularaemia, glanders and brucellosis. Viral agents include those causing Ebola Virus Disease, Venezuelan equine encephalitis, and smallpox.

Toxin agents include ricin, botulinum toxin, and staphylococcal enterotoxin B. The severity of illness and the risk of death from exposure to biological agents will depend on several factors, particularly the type of agent, the route and level of exposure, the vulnerability of the victim and the provision of medical treatment.

Table 2: **Potential biological agents of mass destruction – bacteria and viruses**
Source:
CBRN manager Handbook

Pathogen		Disease	Incubation period [days]	Mortality	CDC category
Bacteria	*Bacillus anthracis*	anthrax	1-3	pulmonary and intestinal form approx. 100%	A
	Clostridium botulinum	botulism	0,5-2	100%	A
	Francisella tularensis	tularemia	1-21	20-50%	A
	Yersinia pestis	plague	1-10	pulmonary form up to 100%	A
Viruses	*Ortopoxviridae Poxvirus*	Smallpox	7-17	20-40%	A
	Ebola virus	Ebola hemorrhagic fever	3-7	50-90%	A
	Marburg virus	Marburg hemorrhagic fever	5-8	30%	A

The most important Bioagents are described precisely in Appendix II.

3.4.4 Nuclear and radiological agents

Nuclear and radiological agents can interact with a person in one of two ways:

- emission of highly penetrating radiation resulting in irradiation of individual
- irradiation of tissues and organs in the body if an agent is inhaled, absorbed through skin or ingested in contaminated food or water

Generally, we differentiate two types of ionizing radiation:

1. Electromagnetic radiation – a stream of photons with energies higher than a photon energy of visible light – gamma (γ), X-rays and ultraviolet (UV) radiation; gamma, X-ray and UV radiation is a more energetic part of the whole electromagnetic radiation energy spectrum
2. Corpuscular radiation – particles α (alpha – nucleus of 4He), particles β (beta – electrons or positrons), protons (p), neutrons (n) and fragments of fission of heavy atomic nuclei

Radioactive materials emit different types of ionizing radiation depending on its chemical and physical properties.

Alpha radiation emits particles that consist of two protons and two neutrons.

These particles are heavy and have strong electrical charge thus they easily interact with matter and have very short range and low penetration, e.g. they cannot penetrate human skin. So alfa radiation is not harmful for people – if outside the body. But very dangerous if inhaled or ingested.

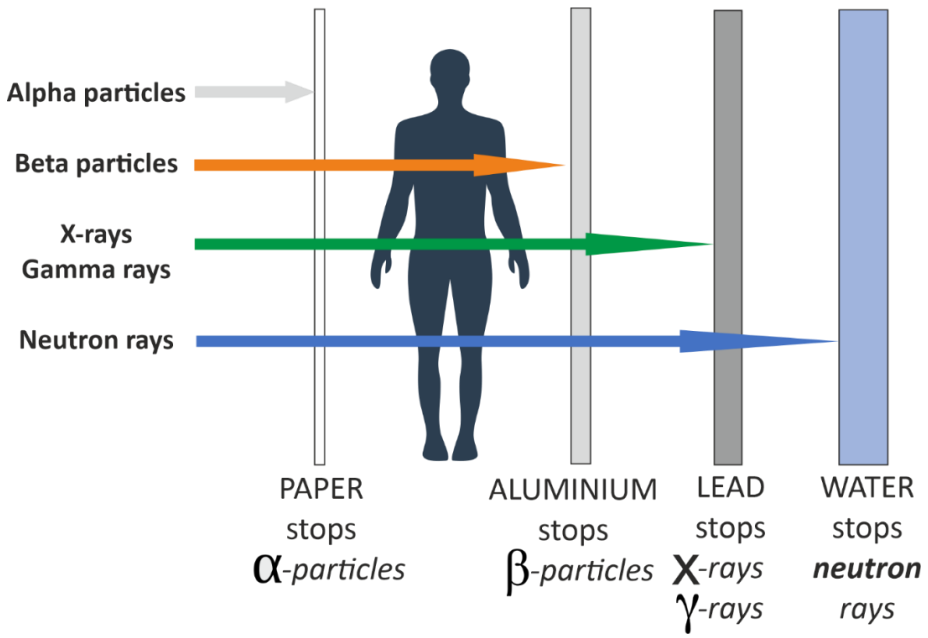


Figure 28: **Types of radiation**
Source:
https://www.dreamstime.com/types-radiation-penetrating-power-paper-human-aluminum-lead-water-types-radiation-penetrating-power-image167415975 [Access 09.02.2023]

Beta radiation emits particles that consist of negatively charged electrons. These particles may travel few meters through the air and are moderately penetrating, e.g. they can penetrate the top layer of human skin.

Gamma radiation and X-rays are highly penetrating forms of electromagnetic radiation that can penetrate many centimetres into human tissue. Damages are dependent on energy gamma radiation.

Neutrons can be stopped by water or concrete.

The differences between nuclear agents and radiological agents relate to their different origin.

Irradiation vs contamination

Person is irradiated if exposed to radiation only (alfa, beta, gamma, neutrons, X ray).

Person is contaminated if exposed to radioactive solid or liquid material (ie. in powder form) (gas can be neglected as it leaves the scene).

In both cases radiation affects the person but irradiation cannot be transferred while contamination can.

In case of irradiation affected person is not dangerous to other people while contaminated person is.

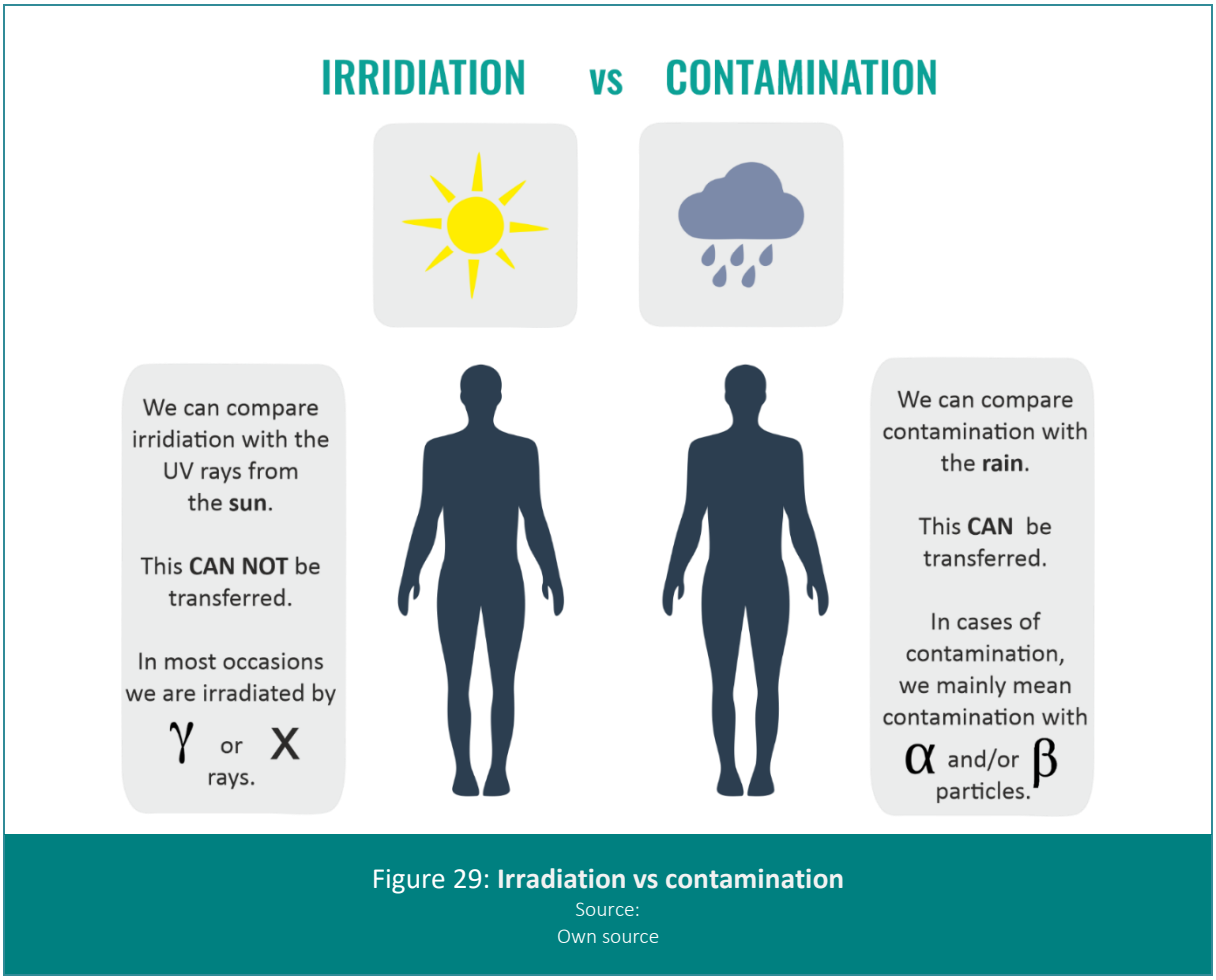


Figure 29: **Irradiation vs contamination**
Source:
Own source

- Radiological agents are radioactive material generated as by-products and waste from the mineral processing industries, produced for use in industrial applications and medical therapy, or occurring naturally in the environment
- Nuclear agents are radioactive material generated from nuclear fission or fusion, such as those produced by detonation of a nuclear weapon or releases from damaged nuclear power plants

Figure 30: **Examples of R (up) and N (down) agents**
Source: Up: https://www.iecpl.com.au/product/radioactive-source-gamma-cobalt-60_932 [Access 06.06.2023]
Down: https://www.bge.de/en/morsleben/short-information/radioactive-waste-in-the-morsleben-repository/[Access 06.06.2023]

The most important Radiological and nuclear agents are described precisely in Appendix III.

4. CBRN DETECTION TECHNOLOGIES

4.1 Detection of CBRN attack/incident

There is a variety of possible methods of delivery CBRN agent to a victims.

Those methods could be as simple as just opening a container containing volatile agent, creation of leak, addition to water we drink or more complicated as creation a dispersion equipment or use of improvised explosive device.

It is extremely important how the agent is delivered, the same amount of specific agent could affect several or hundreds to thousands of people depending of way of delivery or route of exposure.

This is way in CWC not only chemicals warfare agents are considered as a “weapon” but also means of its delivery.

Recognition of early stage of CBRN gives is extremely important for proper reaction and reduction of consequences of an CBRN attack or incident.

Effects of early detection are:

- faster evacuation
- reduced exposure time
- reduced contamination concentration /doses which victim are exposed to,
- reduced spread of contamination (fast ventilation stop, better control of contaminated people)

which leads to:

- lower number of victims
- lower severity of contamination (injury or temporary health effects vs long-term effects or death)

General differences in detection of C, B or RN agents are:

- effects of a C agent (a chemical) on person could be very rapid – symptoms could be fast and could be used for detection of attack
- effects of B agent (bacteria, virus, fungi etc.) could be visible days after exposure – symptoms cannot be used for detection of B – type incident;
- effects of RN agents (radiation) could be visible weeks to months after exposure, unless source is extremely active which is very unlikely. There is no other option to detect RN agents than with use of proper detection equipment

There are significant differences between C, B or RN agents which creates difficulties in early detection:

- Chemical agents: attack or incident where chemicals are involved are characterised by relatively fast observable effects (clouds, odours, droplets, dead animals etc.) or onset of medical symptoms (from minutes to hours)
- Biological agents: those agents are typically colourless and odourless and thus do not create characteristic signatures. Medical symptoms of attack could be observable in longer time (many hours to days or longer) which makes detection of an B incident more difficult. Additionally due to late detection affected area could be greater and control of affected people is very challenging. Bio agents can also have, which is unique among CBRN agents, ability to self-reproduction and creation of a bigger problem in time. Probably the only possibility to detect B attack is detection of the moment of the attack (strange aerosol dispersion, unusual cloud, low energetic explosion)
- Radiological or nuclear material: there is no possibility to detect radiation without detection equipment. Symptoms of exposure to radiation could be observed in days to weeks or even much longer. Because of difficulty in detection possible contaminated area could be greater due to migration of contaminated people.

The most probable RN materials or sources would not generate high enough radiation to kill or seriously injure people.

In case of "dirty bomb" type attack primary hazard comes from explosion and it could be easily detected.

Below easily observable indicators of an CBRN attack are presented:

indicators of an C – type incident[8]:

1. Dead animals (birds, fish) – numerous dead animals of different kind (domestic, wild, small, big) in the same area
2. Lack of insects – if there is missing normal insects activity (no sounds of insects, no flies or mosquitos) it could indicate presence of toxic chemical in the air. If the place is close to water check for dead fish or water birds
3. Strange odours – strange means not normal in the surroundings. Suspicious odour include fruity, flowery, sharp, pungent garlic, horseradish like, bitter almonds, peach kernels, newly mown hay
4. Different looking area – dead weeds, bushes, trees, discoloured or withered leafs, crops
5. Unusual liquid droplets – surfaces are covered with oily droplets or film, water surfaces have an oily film
6. Mass casualties – high number of dead people or having health problems including nausea, disorientation, difficulty in breathing, convulsions, sweating, conjunctivitis, erythema, blisters, weals and/or rashes – see also procedure 1,2,3+
7. Pattern of casualties – casualties distributed downwind, or if indoors, by the ventilation system
8. Illness in confined area – different casualties rate depending on the place of agent release (ie. indoors vs outdoors)
9. Low lying clouds – unusual, not expected in surroundings, clouds or smokes could be an early stage of release of agent. If improvised explosive device is used as a dispersion tool low energy detonation is very likely (in case of B or C-type attack) as strong explosion could destroy an agent
10. Unusual metal debris – unexplained bomb or munition material could be part of military equipment, especially suspicious if contains liquid

[8] ERG 2016

Indicators of an B – type incident[9]:

1. Unusual number of sick or dying people or animal – different symptoms may occur. Casualties could occur hours to days after an incident. Time required for first symptoms to be observable depends on type of agent - see also procedure 1,2,3+
2. Unscheduled and unusual dissemination of spray – especially if outdoors during periods of darkness
3. Abandoned spray devices – devices which were used for an attack, they may have no distinct odour
4. Abandoned piece of PPE (used gloves, protective clothes

Indicators of an RN – type incident[10]:

1. Radiation symbols – containers having radiation symbol on it
2. Unusual metal debris – unexplained bomb or munition-like material
3. Small, metal capsule (opened or closed) or small, dark metal like pellets
4. Heat emitting material – material that is hot or emit heat without any heat source
5. Glowing material – strongly radioactive material may emit or cause radioluminescence
6. Small but heavy package – to deliver safely strong radioactive source heavy lead container must be used
7. Sick people – not very likely scenario as radioactive source creating instant effects should be extremely active thus very difficult to obtain and deliver to the place- see also procedure 1,2,3

Indicators presented above use only human senses to detect the threat- which is important because do not require any additional cost of purchasing and maintaining new equipment or training its users. Additional value of those indicators is that every person working in a shopping centre could be a "detector" of CBRN accident after relatively short training.

Unfortunately human senses have limitations:

- we cannot detect radiation
- we cannot detect bio agents at all or early enough to prevent contamination
- we can detect some of chemical agents starting with very high concertation which is already deadly
- some agents have no colour or odour and cannot be detected by senses
- there are substances with pleasant smell which could be dangerous

[9] ERG 2016
[10] ERG 2016

This is why use of detection equipment is very often the only way to detect the threat or to detect it early enough to react properly.

Description of detection technologies and examples of detection equipment is presented in Appendix IV.

4.2 Requirements for detection equipment

In general two types of CBRN accident could happen:

- unintentional – which could happen as a result of human error in transportation or be effect of failure nearby facility
- intentional – which is criminal or terrorist type of action

Decision about use of detection equipment should be always a matter of analysis.

For example if there is nearby facility where dangerous chemicals are stored, used or produced it is recommended to build a network of dedicated sensors which could detect exactly those chemical in vicinity. This is relatively good situation because the shopping mall owner could know which particular chemicals are present at the nearby facility and generate threat so it is easy to choose proper chemical sensor.

Totally different situation is with a threat deriving from transportation of dangerous goods. There about 60 000 chemicals used in the industry transported by roads, railways or ships, apart of that there are bio active materials and radioactive sources. The mall owner will never know which CBRN agent is transported and which sensors use to protect the venue.

In this case detection equipment could be used only to enhance mall protection against the most important agents (most probable to be used or the most toxic ones).

Intentional type of attack must be also taken into consideration, CBRN type terrorist attack is often classified as low probability – high impact action. It means that it is not very likely to happen but if it happens number of casualties could be huge. The perfect example is an attack on Tokyo subway where 13 people and 5000 were injured.

Some countries are more exposed to terrorist attack than the others (for example there were no terrorist attacks in Poland while there were many in UK or Spain. In those more exposed countries like hood of CBRN attack is bigger and stronger response or better preparedness level is needed, including better equipped detection system.

The first strong and very general recommendation is to elevate awareness level among mall staff and tenants and provide dedicated training in detection by senses (indicators of CBRN incident).

Requirements for detection equipment in shopping centres:

- Simplicity – to shorten training time and assure possibility to use by non-professional users
- Low purchasing cost – low cost makes possible use of more detection units and do not create big pressure on always limited resources
- Low maintenance – to not complicate daily use of it and make it always ready for action
- Wide scope of detection – due to unknown character of agent to be detected
- Short detection time – to detect the threat as fast as possible

Attention:

Please keep in mind that every existing detection equipment could generate false alarms.

There two types of false alarms:

- false positive alarm means that equipment informs user that there is an agent detected (in the air, water- in analysed sample in general) while, in reality, there is no agent present.
- false negative alarms happens when equipment informs user that there is no agent present while in reality there is an agent present.

National / local regulations concerning qualifications of detection and identification of dangerous material staff should be followed/respected (required skills, education level and specialisation, trainings needed, required PPE equipment etc.).

4.3 Detection equipment recommendations

The decision on the selection of the appropriate CBRN detection equipment should be preceded by a threat analysis dedicated to the SM. Many parameters should be taken into consideration:

- level of terrorist threat of the country /region
- level of risk of unintentional release of CBRN material (proximity to chemical plants or warehouses, transport routes for CBRN agents)
- availability of CBRN materials
- potential effects of use
- alternative detection methods
- cost effective
- simplicity

In next 3 subchapters recommendations for various detection equipment are presented. Very wide range of devices is available on the market, starting with simple solutions suitable to detect particular threat (C or B or RN), finishing with very complex solutions that can detect various CBRN threats. An example of this system is ASAP V Multi – Threat Detection System, which is able to detect all classes of CBRN agents and also includes intrusion detection, explosives detection, thermal imaging and X-Ray subsystem. One of very interesting feature of this system is its imperceptibility.

The system looks like an typical infrastructure and none could figure out what is inside which do not create any perception of threat among visitors and also potential perpetrators are not aware of the existence of this kind of protection.

Attention: It is very important to understand that even the most advanced detector is useless without proper training of the user. In fact the more sophisticated equipment is the more training and knowledge is required to use it properly. Well trained user could verify sometimes false readings of the detector.

Figure 31: **General view of ASAP V system - Research International**
Source:
https://resrchintl.com/gallery-asap-v.html [Access:12.12.2022]

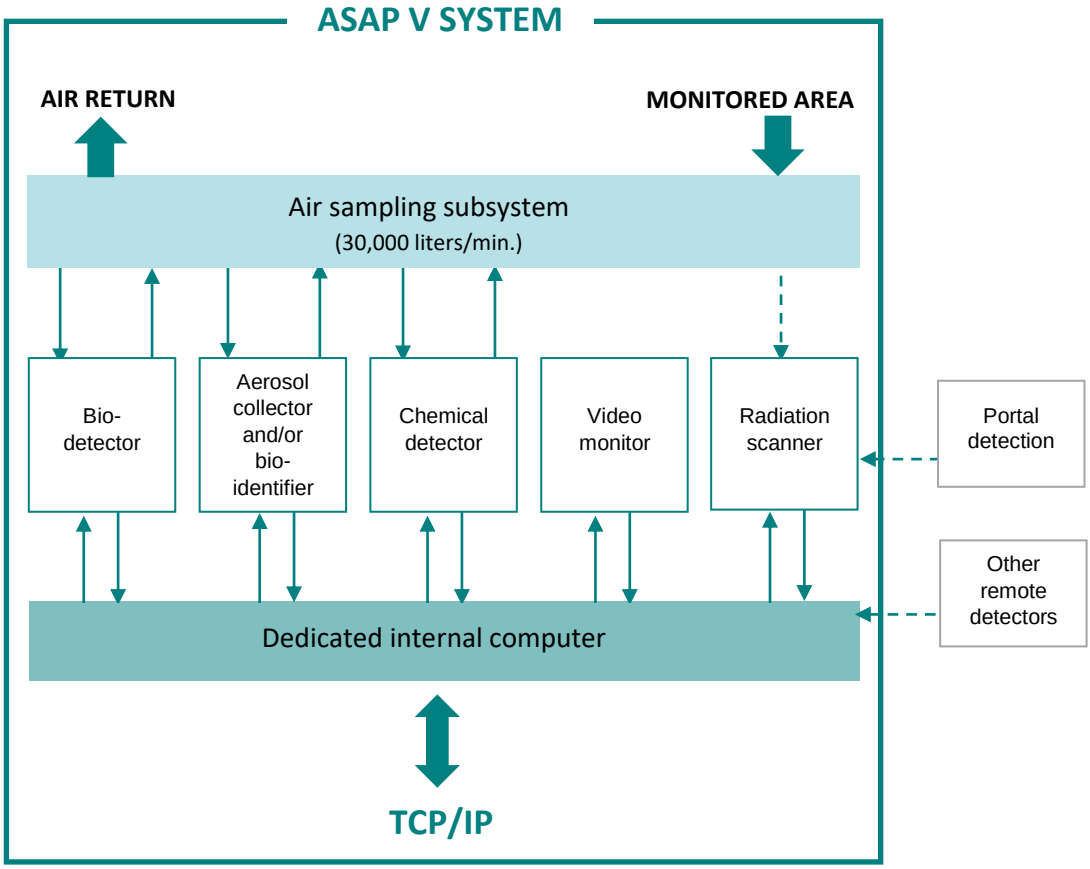


Figure 32: **Functional composition of the ASAP V system - Research International**
Source:
https://resrchintl.com/gallery-asap-v.html [Access:08.12.2022]

Functionalities of the ASAP V System:

- Nuclear, biological, and chemical (NBC) threat detection
- Smoke and fire detection
- Video and sound monitoring
- Intrusion detection
- Thermal imaging
- Meteorological data
- X-ray detection
- Large area air circulation and sampling methods
- Biological and radiological sample collection and storage

This type of equipment represents complex approach but probably due to very high cost of purchase and high cost of maintenance could be implemented in countries /companies exposed to CBRN type of attack or at newly build venues.

4.3.1. Recommendations for chemical threat detection

Chemical incident is the most likely one out of all CBRN incidents due to large quantities of chemicals used in the industry, easiness to acquire them, transportation of dangerous good (where chemicals are the most widely transported), high toxicity of C agents etc. It means detection system should me mainly oriented on detection of chemicals.

For early detection of chemical incident we recommend use of:

1. Detection papers
2. Detection tubes with electric pump and with spare manual pump

If threat level coming from C or E agents is elevated in particular country or region or a shopping Mall is interested in enhanced level of identification of unknown chemicals (ie. high level of false C or E attacks for business disruption) we recommend use of more sophisticated equipment with identifications potential like:

3. FTIR or Raman spectrometer, or both in one like Thermo Gemini Analyzer

Ad. 1. Detection papers like Calid- 3 detection paper[11]

CALID-3 is designed for detection and differentiation between 3 major groups of chemical warfare agents: nerve agents type G (i.e sarin, soman, tabun), nerve agents type V (VX, VXR) and vesicants in liquid form.

A drop of suspect sample applied to the CALID-3 paper creates a colour spot that indicates the presence of chemical warfare agents within 30 seconds.

Figure 33: **Calid-3 detection papers – Oritest group**
Source: https://www.oritest-group.cz/products/ [Access:16.12.2022]

Main features:

1. Simplicity – easiest to use detection equipment available, less than 1 hr training needed
2. Low purchasing cost – about 6 $ per booklet containing several tests
3. Low maintenance – no maintenance needed, shelf life – 5 years
4. Wide scope of detection – blister all G and V nerve agents
5. Short detection time – < 30s

[11] https://www.cbrnetechindex.com/p/3383/ORITEST/CALID-3-Liquid-CWA-Detection-Papers

Ad. 2. Detection tubes – like Dräger short – term detection tubes

The Dräger Short-term Tubes are cost-effective and reliable method for the measurement of gases. Each tube can detect one substance at a time. There are up to 500 detection tubes available so user can customize own configuration.

Figure 34: **Detection tube with Accuro manual pump – Dräger**
Source: https://www.draeger.com/en_uk/Products/Short-term-Tubes [Access:16.12.2022]

Figure 35: **Drager X-act 5000 electric pump– Dräger**
Source: https://www.draeger.com/en_seeur/Products/X-act-5000 [Access:16.12.2022]

Figure 36: **Civil defence set – Dräger**
Source https://www.draeger.com/en_seeur/Products/Civil-Defense-Set [Access:16.12.2022]

Electric or manual pump can also be used, there is a civil defence set available which is able to simultaneously detect 5 chemical warfare agents.

Main features:

1. Simplicity – easy to use, short training needed
2. Low purchasing cost – low cost, cost depends on detected gas
3. Low maintenance – no calibration needed, very little maintenance needed, shelf life – 1 to 2 years depending on gas type
4. Wide scope of detection – scalable, up 500 different gases
5. Short detection time – from 5 seconds to 15 minutes

Description of detection technology used (colorimetry) is provided in Appendix IV.

Detection papers and tubes could be used widely by many operators in different location at the same time as they are cheap and do not need extensive training.

Of course this equipment has limitations. Equipment listed above could be used for detection of specific chemicals. Detection papers could detect presence of nerve and blister agents only. Chlorine detection tube could detect chlorine only. This equipment has no identification potential and can only confirm if the gas present in the air is the same as the one detection tube is dedicated for.

There is a group of equipment which can identify unknown chemical in pure form or even in a mixture. Unfortunately this equipment is more expensive thus has to be used differently - to confirm if the unknown solid or liquid substance is dangerous or not or identify the substance is and what type of threat come from it. Because of cost of purchase and stronger qualifications for the operator probably one unit per shopping mall will be enough to fulfil SM identification needs.

Ad. 3. The Thermo Scientific™ Gemini™ Analyzer[12]

The Gemini Analyzer is able to quickly and safely identify broad range of chemicals and explosives.

This analyser, as the only one in the world, uses two complementary identification technologies: FTIR spectrometry and Raman spectroscopy. Both technologies has strengths and weaknesses by combining them in one device allowed to design a powerful identification tool with decision support capability due to the extensive library of chemicals with description of threats related to the identified chemical and suggested actions. Those technologies are described more precisely in Appendix IV.

Figure 37: **The Thermo Scientific™ Gemini™ Analyzer – Fisher Scientific**
Source: https://www.fishersci.com/shop/products/gemini-analyzer/18001149 [Access:16.12.2022]

[12] https://www.thermofisher.com/order/catalog/product/GEMINI

Main features:

1. Ability to identify a chemical (liquid or solid) in a container (glass or plastic bottle, plastic bag), through the wall of it (without opening) using Raman spectroscopy
2. Lightweight and compact,
3. Virtual mixture analysis and interactive problem solving on scene
4. Leverages Raman, FTIR and SERS technology to address a broader range of samples than either technique alone
5. Identifies unknown solids and liquids, from explosives and chemical warfare agents to industrial chemicals and precursors using a comprehensive onboard library
6. Includes a motorized anvil which adjusts sample pressure based on user settings
7. Features Raman and FTIR Scan Delay to allow users to leave the hazard zone before initiating a scan
8. Easy to use – Guides the operator through technology selection and sampling with Scan Assist
9. Customizable Profiles allow the operator to set scan parameters based on the sample, scenario and their situational awareness
10. Minimizes user error and eliminates subjective user interpretation
11. Requires minimal training for proficiency

4.3.2 Recommendations for Bioagents detection system

In order to exclude an event with a biological agent, we recommend the use of rapid detection methods:

1. Immunochromatography
2. Bioluminometry

Ad. 1. Immunochromatography

Advantages:

1. simplicity – take the test material with a swab, add the buffer included in the kit, mix, apply in the bowl marked "sample" and read the result; one band in the control line – negative result; two lines (in the control and the test lines) – positive result
2. execution time – the result within a few / several minutes depending on the kit

Disadvantage:

1. detectability is limited
2. false negative results

Figure 38: **RAID™ (Rapid Assessment Initial Detection) by Alexeter Technologies LLC**
Source: https://resrchintl.com/QuikTest_HHA.html. [Access: 19.12.2022]

Ad. 2. Bioluminometry

Main features:

1. could determine the content of adenosine triphosphate (ATP), compound present in every living cell
2. simplicity – collect the tested material with a swab compatible with the device, place it in the bioluminometer and read the result
3. very quick determination of the presence of microorganisms in the tested sample – 10-15 seconds
4. low sensitivity to spores
5. low costs

Figure 39: **Luminometer EnSURE™ by Hygiena**
Source: https://www.hygiena.com/hygiena-luminometer-comparison [Access: 19.12.2022]

More detailed information about bio detection and identification equipment and technologies you can find in Appendix IV.

4.3.3 Recommendations for ionizing radiation detection

Following the rule that any device is better than no device for ionizing radiation detection you may purchase absolutely every available device on the market. The authors would like to highlight that every device for ionizing detection should be calibrated and operated by the trained staff, to avoid error readings or misunderstanding of correct measures.

For radiation detection we recommend two types of detectors:

1. personal or portable detectors (personal dosimeter, contamination detector or radiation spectrometers)
2. stationary detector at delivery gates

Ad. 1 Personal or portable detectors

Personal Radiation Detectors

This type of detectors are sensitive, simple, use to use and fool proof.

Advantage:

- cheap
- could locate source of radiation

Disadvantage:

- detects only gamma radiation

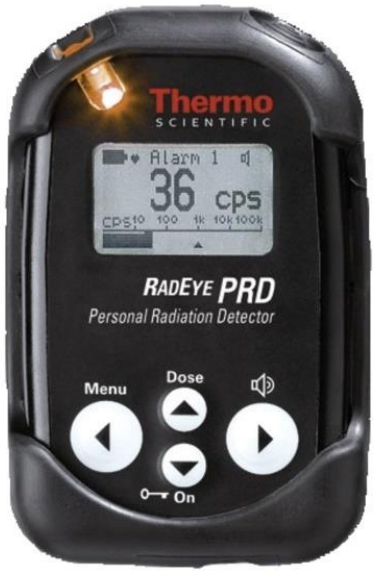


Figure 40: **Personal radiation detector RadEye™ PRD/PRD-ER**
Source
https://www.thermofisher.com/order/catalog/product/4250671 [Access:13.12.2022]

Contamination detector (portable)

Figure 41: **Contamination detector Eco – C**

Source:
(https://strefa998.pl/specjalizacja-poszukiwawczo-ratownicza/1113-monitor-skaze-radioaktywnych-typ-eko-c.html) [Access: 08.11.2022]

Advantage:

- most of contamination detectors are multifunctional devices, for that reason you may switch modes to measure: surface contamination [Bq/cm2], or dose rate [□Sv/h]
- the devise is quite cheap and simple in use

Disadvantage:

- it shows only the external exposure and only from gamma radiation (dose rate mode)

Spectrometer (portable)

Advantage:

- most of portable spectrometers are multifunctional devices. You may switch the mode to measure: dose rate (gamma and neuron radiation) or analyse appropriate isotope that you deal with

Disadvantage:

- it shows only the external exposure and only from gamma and neutron radiation (dose rate mode). The cost of purchase is dozens of thousands EURO
- spectrometers are operated by the personnel after advanced training

Figure 42: **Spectrometer IdentiFINDER® R400**
Source:
https://www.flir.com/products/identifinder-r400/
[Access:17.12.2022]

Ad.2 Stationary detector at delivery gates

Stationary radiation monitors

Advantage:

- very sensitive stationary systems that monitor and control quite large areas. The system might be connected to national radiation monitoring system (after agreement with appropriate Authority)

Disadvantage:

- quite high costs dependent on the needs of the customer

Figure 43: **The stationary radiation monitor**
Source:
https://www.lumel.com.pl/en/catalogue/product/pedestrian-or-vehicle-inspection-for-gamma-neutron-radiation)
[Access: 18.12.2022]

Attention: Please keep in mind that every existing dosimetry detection equipment could generate strange or unexpected alarms. Possible causes are:

- elevated natural radiation background in the mall – elevated background may come from usage of some building material groups, where observed increased content of radioisotopes such as sandstones or granites. These natural materials generate Radon – radioactive gas, which comes from natural decay chain such element as Uranium and Thorium
- detection of people after medical treatment with using radioisotopes. These people will not cause any danger for living creatures, but dosimetry equipment will "see" these anomalies in natural background
- temporary equipment failure – restart of the device is needed

More detailed information about radiation detection and identification equipment and technologies you can find in Appendix IV.

5. PERSONAL PROTECTIVE EQUIPMENT

5.1 PPE description

PPE is individual, specialized equipment and clothing for workers that will provide protection against hazards (e.g. chemical agents, infectious agents and toxins).

General work clothing (such as coveralls, trousers, work shirts) are not considered as PPE. There is a range of clothing available to protect against CBRN agents.

The use of the specific PPE required is determined by a risk assessment, while to counter the effects of a terrorist attack with CBRN agents, the aim should be to protect as effectively as possible against all possible scenarios.

When selecting appropriate PPE, size is a very important criterion. Choosing the right size of equipment ensures that its properties are maintained. Further factors influencing the effectiveness of protection are the use of compatible PPE (masks, goggles, suits, gloves), proper fitting and sealing of the connections so that they form a tight unit, proper training in dressing and undressing.

More specific information about classification of PPE could be find in the Appendix V .

5.2 Protection equipment

5.2.1 Eye protection

They should provide eye protection against chemical and biological splashes and protect against dust. Structurally, goggles and safety glasses should have shields on the sides to prevent these substances from entering the eye in angled splash situations. Prescription goggles are also available in specialist shops.

Very often eye protection is integrated with face masks, which provide the best protection.

Safety glasses do not provide full protection against dusts, vapours and aerosols entering the eye, so the use of suitable protective goggles is recommended.

Goggles made of soft components that provide a tight fit with a suitably curved surface to fit the face work best.

Figure 44: **Goggles**
Source:
Own photo

5.2.2 Respiratory protection

Respiratory protective equipment is used to protect personnel from inhaling airborne hazardous substances and materials in various forms (aerosols, liquid/solid particles, gases or vapours). There are a number of possible hazards associated with respirators, which must be borne in mind in order to avoid them:

- incorrect fit and wearing of respiratory masks - a mask cannot fully protect if it is not fitted to the face
- touching the inside of a respirator mask (which traps viruses etc.), can result in the transfer of contamination and eventually lead to substances entering the mouth and nose
- taking unnecessary risks of exposure for respirator wearers, as a result of a false sense of security; it is always safest to keep a distance, an appropriate distance from another person or hazard zone

There are three types of respiratory protection (forced-circulation filtering masks):

1. Air Purifying mask
2. Filtering half-masks
3. Full-face masks

These devices filter the air of hazardous substances. The use of a particular solution depends on the air quality in the environment.

They can only be used when the oxygen content is at an appropriate level (minimum 17%) and the type of hazardous substance is known (only the correct filter used ensures correct functioning). It is therefore advisable to use masks with filters with the widest possible spectrum of action.

The following protection measures can be distinguished:

1. Disposable respirators/dust half-masks - recommended filtration class FFP3/P3/N99/N100 - they do not provide protection against chemical substances in gaseous form, and are mainly used when the hazard is macro, such as bacteria, viruses, dust carrying radioactive material, pathogenic and fungal spores and aerosols (except aerosols of chemical substances with a vapour pressure at ambient temperature giving concentrations above the safety limit),

Figure 45: **Disposable half-mask**
Source:
Own photo

2. Partial masks - half masks with replaceable filters - depending on the filters used, provides a good respiratory protection solution for most CBRN hazards,

Figure 46: **Half-mask with replaceable filter**
Source:
Own photo

3. Full-face masks - provide respiratory and eye protection at the same time, available in single or dual-filter versions:
   - isolation or self-contained breathing system - mainly used in areas where the oxygen content is below 17% or where there is a dangerous concentration of hazardous substances. This solution provides a constant supply of air or oxygen and is a self-contained breathing apparatus. When used correctly, it provides full protection against the effects of CBRN agents. The equipment requires periodic technical inspections and personnel using it must undergo appropriate medical examinations and training
   - escape - these are used in emergency situations to provide immediate protection from harmful agents for a limited period of time

Figure 47: **Full-face mask**
Source:
Own photo

There are:

1. Ambient air-dependent devices - these are fire and industrial escape hoods with efficient filtering devices installed, designed to protect against toxic gases, vapours and industrial and fire particles, ensuring adequate filtering for a minimum period of 15 minutes; this type of device is dependent on ambient oxygen.

2. Equipment independent of ambient air:
   - compressed air apparatus - these are systems that provide a continuous supply of air for a minimum of 15 minutes from a compressed air cylinder, and come in the form of a full-face positive pressure mask or escape hood
   - regenerative breathing apparatus - providing access to oxygen in toxic gas conditions and in the absence of oxygen in a given environment; depending on the version, they provide air supply for up to 60 minutes

5.2.3 Protective gloves

They are an additional element of protection for the overall security management staff. They should be used whenever a CBRN incident is suspected. They must meet a number of requirements; they should be resistant to chemical, biological substances, resistant to abrasion and other damages, thin enough not to impede manual activities. Their selection is therefore crucial to ensure adequate protection for the worker. By design, double-dressed pairs of gloves should be used during CBRN incidents.

This serves primarily to protect against cross contamination when undressing after decontamination, in addition to providing additional protection against damage to the top protective layer.

Figure 48: **Protective gloves**
Source:
Own photo

The most versatile and protective gloves are nitrile protective gloves with a thickness of 0.2 - 0.4mm, which have adequate chemical and biological resistance, mechanical resistance, anti-static properties and do not significantly impede manual activities.

5.2.4 Protective clothing

Protective clothing provides a barrier between harmful external agents and the human skin. Depending on the application and the risk, it is divided into categories:

Category I - providing protection against minimal risk

Category II - providing protection against specific factors not endangering life and health

Category III - representing protection against external factors endangering life and health

The suits of the highest category of resistance, are divided into subcategories (type 1-6). They are made of materials that provide adequate chemical and biological protection and are lightweight and comfortable. The most versatile suits for non-professionals are those meeting the requirements for Type 4B clothing (protection against pressurised liquid jets and biological agents). Additional equipment includes shoe protectors and an integrated protective hood. In order to ensure adequate protection, it is essential to have the right size, training in dressing and undressing.

5.3 Rules for proper protection equipment selection

After identifying the type of dangerous substance, choose the type, the type suitable for this substance and choose the protective clothing class.

Other important factors affecting the selection of equipment:

- intensity of work - the degree of effort at work is associated with a greater amount of air inhaled by the worker, which leads to an increase in resistance to breathing
- working time - the time of using respiratory protective equipment is sometimes limited by the properties of the equipment itself, e.g. the breathing apparatus has a limited amount of air in the cylinders. Very high concentration of a dangerous substance reduces the time of use of the absorber. During a long working time, it is important to use high-quality equipment that influences the comfort of use. You can also consider using an air supply system
- ambient temperature, humidity - increased temperature at the workplace leads to increased effort, especially in combination with high humidity - recommendations such as high intensity of work. In addition, be aware that elevated temperature and high humidity can affect the reduction of the canister's operating time
- visibility - all types of respiratory protection reduce the field of view. This is especially true for full face masks - so they should be equipped with a viewfinder with a large field of view
- communication - facial parts of the equipment distort the voice, but communication is possible in a relatively quiet place and for short distances. Some masks have a built-in membrane for easy conversation
- tightness of the mask - it is very important to ensure proper tightness of the face part. Users can have different shapes and sizes of the face and facial hair. Masks and half masks are also supplied in various sizes. It is important that everyone before wearing the mask checks its tightness of adhesion - in the case of half masks and masks, it is necessary to close the air inlets with your hand and try to inhale while watching if there are air leaks at the place where the mask meets the face. For people with particularly heavy facial hair, for example, there are systems with air supply that generate some overpressure in the face area

5.4 PPE recommendations

Different agents classes (C, B or RN) require different protection systems. For instance for many B agents efficient filtration against particles is enough to protect respiratory system. So FFP3 mask will be good enough to significantly reduce threat from B agents. It could also reduce contamination risk from radioactive dust, especially vs radioactive materials emitting alfa beta or radiation, but not vs chemical agents. On the other hand masks with gas filter could absorb toxic gases and also filter out bio or radioactive particles. Recommendations provided below do not require identification of threat class (C, B or RN) as it could be not possible at the moment of CBRN attack or incident.

Please keep in mind that protection vs radiation proposed below is focused on inhalation of active particles or radiation gases only. There is no efficient PPE vs radiation.

There are only 3 ways to reduce radiation threat:

1. Distancing – stay as far as possible from the radiation source (again - run away)
2. Timing – reduce exposure time (in short words - run away)
3. Shielding – put some material absorbing radiation between a radiation source and exposed person – but different material are effective depending on radiation. Shielding is a good option in radiac laboratories or facilities

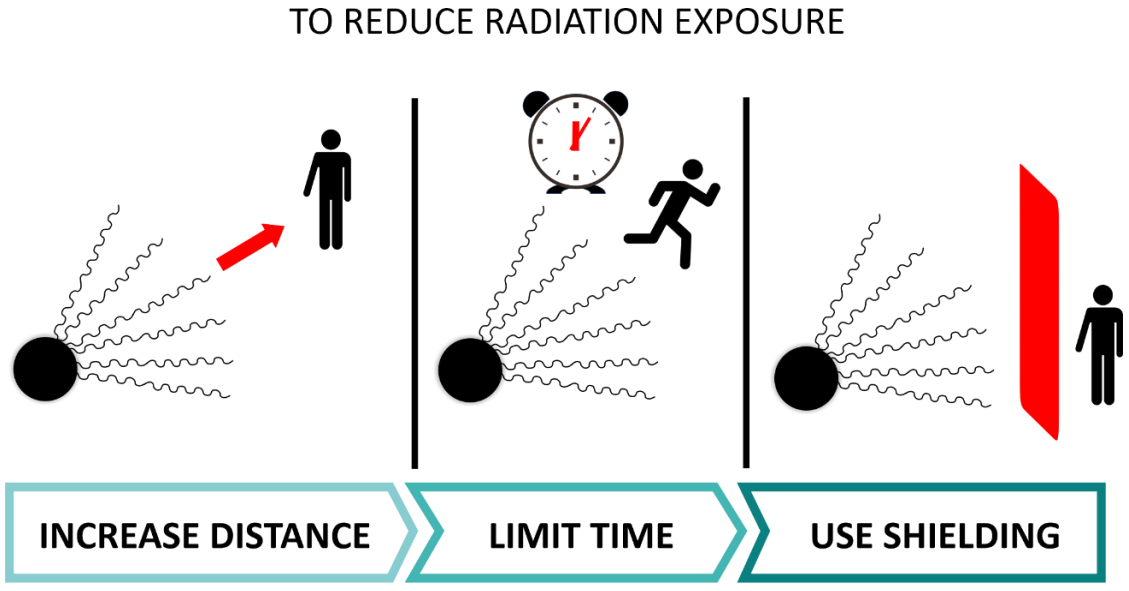


Figure 49: **To reduce radiation exposure**
Source: based on www.epa.gov/radiation/protecting-yourself-radiation [Access:.06.2023]

Requirements for CBRN PPE:

- simplicity – to make use of it easy and
- universality – to protect a person against all CBRN agents classes
- low purchasing cost
- low maintenance cost
- protection long enough to perform intended action (escape or manage the scene)

Victim Rescue Unit Plus

This type of protection is recommended for escape from danger zone or through contaminated zone if there is no other way.

It could also be used to rescue a person which is trapped and is using shelter-in-place procedure.

Features:

- simplicity – it takes seconds to be don
- universality – provide protection versus all CBRN agents classes
- low cost of purchase
- no maintenance needed
- shelf live: 10 years
- protection time: up to 60 minutes

Figure 50: VRU+ (Essex Industries)
Source: https://essexindustries.com/products/victim-rescue-unit-plus-vru/) [Access:16.12.2022]

Gas mask MP6

This type of gas mask could be used vs different CBRN agents and if case of nearby chemical plant or chemical storage facility dedicated gas filters could be used.

This is PPE dedicated to security staff or managers working for longer time in contaminated zone (managing evacuation, checking places).

Features:

- simplicity – it takes seconds to be don (short training needed)
- universality – provide protection versus all CBRN agents classes
- moderate cost of purchase
- low maintenance needed
- shelf live: mask: 10 years, gas filter – up to 5ys
- protection time: up to 24h (depending on gas concentration, gas filters could be changed in contaminated area)

Figure 51: **Gas mask MP6**
Source:
Own photo

Protection gloves – example: ANSELL TNT TOUCHNTUFF® 92-500

Nitrile gloves

Any nitrile gloves provide good temporary protection vs different chemicals.

The thicker the longer protection time and lower puncture risk. For better safety user can wore two gloves one on another. It is strongly recommended not to touch anything in contaminated area, but sometimes user has to open the door or touch access pad.

This equipment is recommended for security officers or managers having roles (for instance during evacuation) in contaminated area.

Features:

- Simple to use- short training needed especially for removing step
- very low cost of purchase- less than 0.5 euro per pair
- No maintenance needed

Protective clothes

Protective clothes are type of equipment which needs time to be worn. If a user wears this PPE in a hurry it could leads to false protection confidence. Moreover if there is no decon station deployed and no one could help take off protective clothes it could lead to secondary contamination.

So it is better to run away faster than spend time on wearing protective clothes.

We recommend:

- use of escape hoods (like VRU+) especially for people controlling evacuation
- full face gas mask – for managing staff (security and SM management),
- use of protection gloves – for people controlling evacuation

6. CBRN SECURITY APPROACH

The approach to CBRN threats is far different from the accepted standards associated with shopping mall security than for other hazards. From the analysis of the data collected during the study visits, it appears that most shopping malls are based solely on the response to criminal incidents, and the evacuation process is associated only with fire hazards.

Existing security systems and procedures are focused on most likely scenarios of a terrorist attacks like left luggage or bomb alarm. It is not possible to predict all scenarios of terrorist attacks.

According to the project observations, general response procedure to a CBRN attack were not commonly found.

In order to effectively address the risks associated with the use of CBRN agents, it is first necessary to identify vulnerable points and then to determine the risk level.

Threats are divided into two groups. Internal threats (vulnerable points), related to sites and incidents located within managed property, and external threats related to incidents located outside the shopping mall area.

6.1 Vulnerable points

Vulnerable points are locations through which the effectiveness of CBRN agents can be effectively delivered or dispersed. From the analysis of the data collected during the study visits the following locations have been identified.

Parcels/letters

From historical incidents, it can be concluded that postal and shipping networks are used to deliver biological pathogens (e.g. via contaminated letters delivered by post) to selected facilities and individuals. Bioterrorism arouses understandable fear because the agent used - haemorrhagic fever virus, or smallpox, plague bacillus, anthrax bacillus, etc. - creates fear far beyond the actual threat.

Distributing Bacillus anthracis spores or any other pathogen by post is not an effective way to cause an epidemic. However, for those responsible for the attack in the US, another objective was achieved - to create panic in the US and beyond. Gas masks in New York were sold out. Desperate US citizens stockpiled so much ciprofloxacin - an antibiotic used by the US Food and Drug Administration to treat anthrax - that many pharmacies and medical institutions ran out of stock.

Over time, the sense of fear has diminished, but the current pandemic and the revolution in biotechnology means that the theme of the threat of biological agents remains high. What's more, fake letters are putting public health institutions and infrastructures around the world in the face of alleged terrorist attacks.

Between 1970 and 2017, 39 terrorist attacks involving other hazardous substances sent by mail were reported.

Thirty-six of these attacks occurred between 2000 and 2017. The materials used in these attacks were Bacillus anthracis (21 attacks), pesticides (4) and cyanides (3).

In five cases, the specific type of material was not identified.

Most of these attacks took place in the United States (23). Other locations included New Zealand (6), Kenya (3), the Czech Republic (2), Pakistan (2), the United Kingdom (2) and Chile (1).

In shopping malls, mail distribution is targeted at administrative structures and tenants. Mail delivery is either direct or via mailboxes.

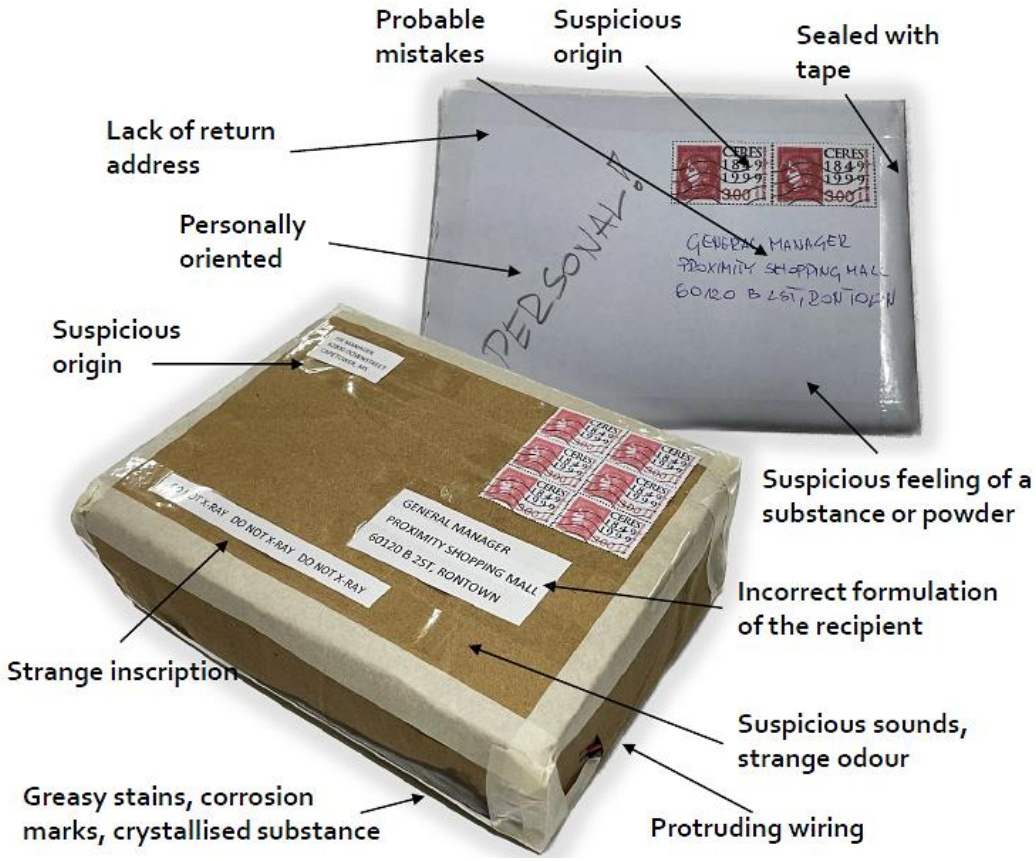


Figure 52: **Suspicious letter and parcel**
Source:
Own photo

Infected persons

Figure 53: **Infected person at the mall**
Source:
Adobe Stock

Shopping malls bring together large numbers of people and are an excellent place to spread disease. Serious risks are posed by people who are ill or carriers and are in public spaces.

Some infectious diseases can be spread through the droplet route. Mainly through aerosolisation of bodily fluids in the air from coughing and sneezing, or from contact with a surface on which viruses or bacteria are present and subsequent transmission to the mouth or nose.

Naturally occurring outbreaks of infection by highly lethal agents are rare due to improved standards of living, hygiene and healthcare in developed countries. For example, the plague, of which rats were the reservoir in past centuries and caused many deaths, has been virtually eradicated.

However, the agents used in an aerosol attack may act differently from naturally occurring outbreaks and may cause a form of the disease with a shorter onset time, making timely diagnosis more difficult. In this case, the treatment process and prevention of the spread of the disease is more difficult.

The global pandemic of the SARS-CoV-2 virus has forced all countries in the world to take this threat seriously and to adapt legal, procedural and technical regulations to the epidemic emergency.

Therefore, shopping mall staff should be aware of the possible risks, how to recognise, deal with and respond to such threats.

Fountain

Indoor fountains, an increasingly common architectural form, are an interesting, year-round decoration located most often in large-scale shopping malls or sometimes in renowned hotels or restaurants. Such installations come in the form of walls, blocks and fancy tanks with flowing water and original illumination, among others. They are a great attraction for people staying in this type of facility. However, it appears that fountains, despite their many advantages, mainly aesthetic and decorative, can be a potential source of contamination.

Due to free access to water by members of the public, fountains are sometimes potentially used for a variety of purposes (e.g. washing and immersion of hands, soaking of tissues, rinsing of packaging). These and other activities involving direct contact with the water flowing from fountains should be prohibited, but both the design (construction) and location of the fountain mean that in many galleries the fountain is intended to be the exact place where people are drawn to. Biological contamination of the water will definitely facilitate the spread of bacteria through contact with the water. An additional source of water contamination can be hazardous chemicals, including those that react in contact with the water to give off toxic or explosive gases that are dangerous to human health, especially for young children.

Figure 54: **Fountain**
Source: https://www.totallandscapecare.com/business/article/15037169/transforming-city-center-with-water-fire-features [Access: 07.01.2023]

Such compounds include: alkali and alkaline earth metals such as sodium, lithium, potassium, calcium, magnesium; anhydrous metal halides such as aluminium or germanium and non-metal halides; anhydrous metal oxides; calcium carbide (carbide), benzoyl chloride, acid anhydrides, azides, phosphides, arsenides. In addition, there may be chemicals in the water used to keep the water clean that can be harmful to human health.

Ice rink

An artificial ice rink is a great attraction for children and adults. With the right cooling technology, a facility can be built that is completely or partially independent of weather conditions.

The most common are the seasonal ice rinks that appear every year in some shopping malls.

Figure 55: **Recreational Ice Rink Chiller Systems**
Source: https://berg-group.com/products/ice-rinks/ice-rink-chiller-systems/ [Access: 07.01.2023]

Maintaining a low temperature where the ice will not melt requires appropriate technology. Usually, a special cooling unit connected to a freezing installation is used. This installation consists of a complex system of tubes, which have the task of supplying the so-called refrigerant to the surface of the ice rink. This ensures that the ice remains frozen at all times.

One of the working fluids used to cool the refrigerant in such units may be ammonia, which is a toxic chemical. The failure of refrigeration installations or their deliberate sabotage can pose a great danger to the life and health of the people in the shopping mall. Therefore, when planning or maintaining this type of installation containing poisonous agents, it is necessary to take into account not only the legal regulations regarding the use of such substances, but also the appropriate procedures, technical solutions, rescue measures, procedures and adequate personal protective equipment in the event of a leak or deliberate sabotage.

Unmanned Aerial Vehicle UAV

Technological developments have made flying drones increasingly common in everyday use. While they have been used for entertainment purposes until recently, over time they have started to find applications in various areas of life or industry, as well as for military or terrorist purposes, where they are used as reconnaissance platforms, carrying warheads or improvised explosive devices.

With the use of this device, it is possible to reach places that are difficult to access and are protected from unauthorized access, so it is necessary to anticipate the possibility of defending against such an attack in order to minimize its effects.

Figure 56: **XAG P Series 2020 Agricultural Drone**
Source:
Source: https://asia.nikkei.com/Spotlight/Startups-in-Asia/Chinese-startup-sows-seeds-of-farm-revolution-with-drones-and-AI [Access: 02.01.2023]

Ease of operation, access and low cost make UAVs the perfect platform for dispersing CBRN agents in terrorist attacks. Specialised drones seem ideal for this type of application. They are capable of dispersing up to several tens of litres of agent in a short period of time. Transport by air bypasses all the security safety measures, countermeasures are costly, difficult to apply and relatively easy to bypass.

As air intakes are located on rooftops in most facilities, and these in turn are well protected from third-party access, the use of a UAV may be the only way to deliver the CBRN agent to these facilities. The use of this dispersal means is also additionally desirable due to the anonymity, security of the assassin himself and the minimal number of people required to carry out the assassination. He or she is able to carry out an effective attack alone from a safe distance and his or her location is extremely difficult to detect as well as difficult to protect against.

Ventilation system

A mechanical ventilation system provides a weather-independent, continuous supply of fresh air to rooms and removal of used air. Depending on the size of the building, it can function as a single system or a network of independent units.

The system is potentially exposed to hazards from the spraying of chemical, biological or suspended substances that emit ionising radiation. Most air intakes are equipped with filters of varying efficiency. These filters partially eliminate macromolecular hazards such as bacteria, viruses, especially those deposited on media and ionising radiation-emitting particles. However, these filters are not effective against gaseous chemical substances.

Adequate protection of access to the technical space ensures that equipment and the transmission network are always kept away from the immediate risk of contamination. Among the most exposed components are air intakes, air handling units and transfer ducts. In some existing buildings the air intakes are located below or at ground level. It is beneficial to locate the air intake at the highest practical level of the building.

To protect against malicious activities, air intakes should be screened to prevent objects and hazardous materials from being thrown into them. Such screens should be angled so that thrown objects can roll or slide off the screen, away from the intake.

Shopping malls typically have multiple ventilation zones, each served by its own air handling unit and duct system. In practice, these zones are not completely separated if they are on the same floor. Air flows between the zones through corridors, vestibules and doors, which are usually left open. The isolation of ventilation zones minimizes the potential spread of airborne hazards in the building and reduces the number of people potentially exposed in the event of a CBRN agent release. Unfortunately, the openness of shopping mall spaces makes effective zone isolation impossible. Nevertheless, this type of protection is possible, for example, in administrative and office areas.

Figure 57: **Ventilation system**
Source:
Own photo

Left luggage/object

Due to the nature of shopping malls, their architecture and security capabilities, left luggage alongside theft is the most common incident. Given this, the use of a suitcase, bag or rucksack represents a potentially high probability of being used to carry out an attack. Such items are natural and do not raise obvious suspicions. It can be very difficult to locate such item, especially during rush hour when there are a significant number of people in the shopping mall.

Without a well-organised security system combining technical measures, physical protection, tenants and customer awareness, preventing an attack using this method can be very difficult. An additional factor that raises the risk factor is the amount of agent that can be brought into the premises of the shopping mall. Approximately 20 kg of dangerous substance can be placed in a medium-sized suitcase. In such a small space, the number of victims of a potential attack can be significant.

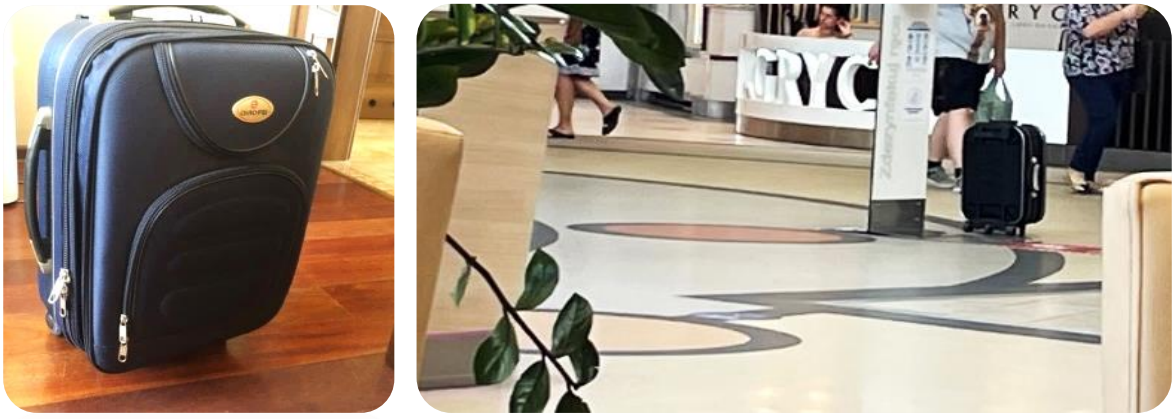


Figure 58: **Left luggage**
Source:
Own photo

Vehicle attack

Depending on the size of the vehicle, they can transport significant amounts of goods into the shopping mall. Therefore, they represent a high potential for a terrorist attack using CBRN means.

Factors that increase the possibility and effectiveness of carrying out such an attack are:

- freedom of movement within the SM on designated internal roads
- proximity of car parks to the façade of the facility

- location of evacuation assembly points in the car parks
- underground car parks - providing a trap for vehicle evacuees
- inadequate anti-terrorist security of entry points
- anonymity - theft or rental of a vehicle
- additional possibility of people being rammed increasing the effectiveness of the attack
- installations (e.g. gas pipe, water installations, etc.)

Internal installations

Within the shopping mall there are many technical installations such as gas, electricity, water, fuel and other installations. These installations can be used directly or indirectly to carry out a terrorist attack using CBRN means.

An important element is the need to locate the sensitive points of these installations vulnerable to terrorist attacks and to secure them appropriately. The main efforts should focus on the technical security of the area in question against unauthorized access. This should be preceded by a security audit carried out by specialized companies, paying particular attention to gas and oil installations in order to identify unauthorized access and potential terrorist vulnerabilities.

Figure 59: **Ventilation system pipes**
Source:
Own photo

Appropriate measures should then be devised and implemented to protect these installations from the possibility of damage or use in an attack.

6.2 External threats

External threats are related to incidents located outside the shopping mall area.

From the analysis of the data collected during the study visits the following locations have been identified.

Dangerous goods transit

Dangerous goods are substances and chemical compounds used in many industries, mainly in production processes. Consequently, there is a need to transport them in accordance with existing regulations. The term dangerous goods also includes biological and radiological materials. The transport of dangerous goods poses a potential risk to facilities located in the transit zone of these commodities. It may arise from the effects of land traffic disasters, the malfunction of technical installations of the vehicles transporting them, fire or explosion.

The zone of influence of some of the transported goods, depending on weather conditions and the type of incident, can reach up to several kilometres. Therefore, such risks must be taken into account in the safety plans and instructions of the facility. Lists of facilities with a heightened or high risk of industrial accidents, where their location, type of hazard and often the quantities of hazardous substances stored are given, can be helpful here.

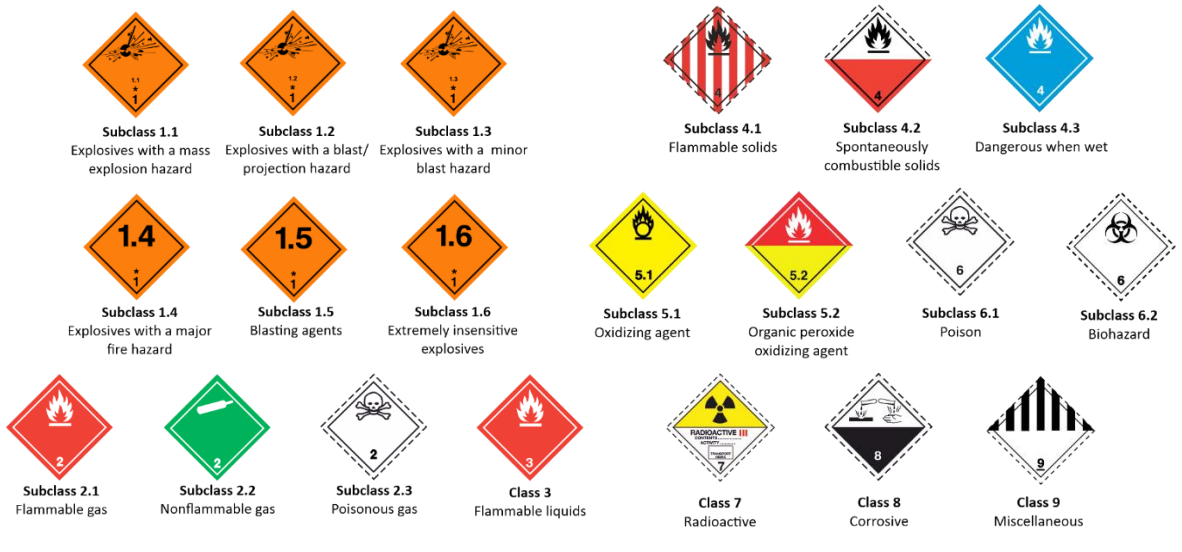


Figure 60: **Dangerous goods classification**
Source:
United Nations Economic Commsion for Europe, Public domain, via Wikimedia Commons, https://en.wikipedia.org/wiki/Dangerous_goods [Access: 01.07.2023]

Industrial plants and installations

Serious industrial accidents, due to the significant quantities of hazardous substances that can be released into the environment, pose a potentially high risk to facilities located within the vicinity of such plants or installations (an example of a chemical plant below).

In 1984, in Bhopal, India, the accident and release of about 30 tonnes of methyl isocyanate, a substance used in pesticide manufacturing processes, resulted in the immediate deaths of more than 3,000 people and the deaths of a further 15,000 as a result of complications from exposure to the substance (from 3 787 to 16 000 depending on source). About 500,000 people were injured.

Accidents can occur as a result of technical failure or explosion arising during production processes, but also intentionally through sabotage or terrorist attack. Depending on factors such as the strength and direction of the wind or the temperature, the zone of influence of the substance may change substantially.

When analysing and responding to these risks, it is important to consider:

- type of industry and possible risks associated with it
- type of branches and routes of transport running in the vicinity of the site (road, rail, inland waterway, air)
- distance and direction from these points
- type of systematically transported dangerous goods
- determine the appropriate action after the incident has occurred
- establish a risk communication point with nearby facilities and relevant services
- carrying out systematic training related to the risk procedures in place

Figure 61: **Chemical plant**
Source:
https://www.coim-srl.it/en/industrial-installations/# [Access: 05.01.2023]

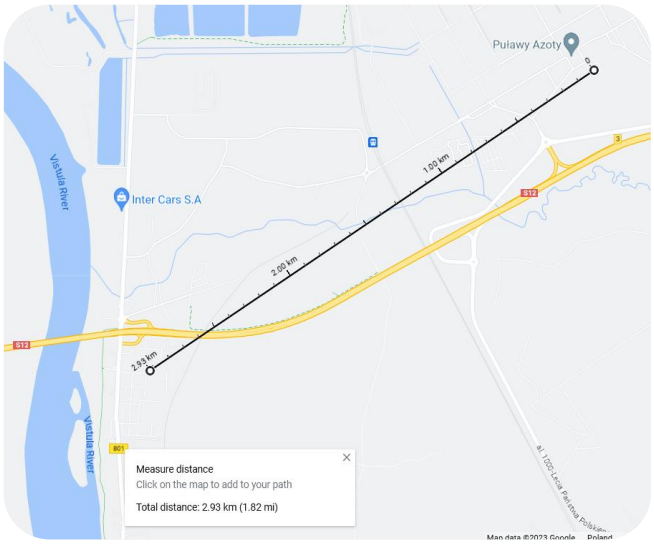


Figure 62: **Example of big chemical plant near SM in Pulawy, Poland**
Source:
Google Maps

6.3 Vulnerability assessment register for SM

An important step before taking decisions for planning and modifying the protection system to reflect the prevention and response to CBRN threats mentioned in previous chapters is detailed describing the current status of the site and identifying vulnerabilities. Various approaches can be adopted, one of which is Mall-CBRN Vulnerability Assessment Register.

The tool is dedicated to shopping mall staff responsible for site security. The register allows to identify and to assess a wide range of vulnerabilities related to public places protection against terrorist threats as they have also a direct impact on the CBRN protection. Expert knowledge of public places security and counterterrorism is required for proper operation. Otherwise, the assessment of the threat level may be incorrectly determined.

This tool is reflecting the specific conditions of shopping centres and designed for conducting a self-assessment of the CBRN protection level based on identification of the existing gaps and their assessment based on the level of impact and probability to adequately address the corrective security measures.

For shopping malls without such capabilities, a consultation with the security expert of o public places protection is recommended.

The Vulnerability Assessment Register is provided in editable version as an EXCEL spreadsheet with a filled-in sample form as an appendix VII to the handbook. The tool could be easily adjusted to the needs of a specific application by adding questions to the checklist or omitting not relevant ones.

First step in application the Vulnerability Assessment Register is to identify the vulnerabilities in existing protection system by completing the predefined checklist divided into 5 main groups:

1. Safety procedures and work organization at the shopping mall
2. Security personnel - organization, training, personal equipment
3. Technical infrastructure and systems
4. Cooperation with services
5. Other issues not covered elsewhere

The answers to the checklist's questions are divided in columns where following information are collecting:

1. Area number
2. Area's description (questions to identify the current status)
3. Vulnerability number
4. Description of the facts (current status)
5. Identified vulnerabilities (weaknesses /objections/gaps)
6. Comments (additional information)

Table 3: **Mall-CBRN Vulnerability Assessment Register - checklist scope**
Source: Own source

Area number	Area description (questions to identify the current status)	Vulnerability number	Description of the facts (current status)	Identified vulnerabilities (weaknesses/ objections/gaps)	Comments (additional information)
AREAS GROUP 1 – Safety procedures and work organisation at the shopping centre					
1.1	Security plan adequacy and quality in terms of security, identification, response and recovery from CBRN events				
1.1.1	Does the facility have a comprehensive security plan including protection policy and procedures and reaction to critical events?	V.1.1.1			
1.1.2	Is the plan regularly reviewed and updated?	V.1.1.2			
1.1.3	Does the plan include procedures for securing, identifying, responding to, and recovering from CBRN events?	V.1.1.3			
1.1.4		V.1.1.4			

Second step, after completing the information according to the checklist, is to assess identified vulnerability according to simplified risk analysis methodology resulting of multiplication of estimated levels of the Impact on the facility (I) and the threat Probability (PR).

The vulnerabilities are evaluated on a five point scale according to specific criteria.

IMPACT on security level (I) The higher impact, the more adverse effects.

To be taken into account in the assessment:

- impact on shopping centre customers and employees safety
- infrastructure, material losses
- public relation issues

Table 4: **Mall-CBRN Vulnerability Assessment Register - impact scale**
Source: Own source

IMPACT SCALE		
1	very low	no impact on facility
2	low	low impact on facility, will not cause significant material losses, medium limitation in facility functioning, medium infrastructure damage, will not cause a threat to people health
3	medium	medium impact on facility, can cause significant material losses, high limitation in facility functioning, high infrastructure damage, should not cause a threat to people health
4	high	high impact on facility, very large material losses, very high limitation in facility functioning, very high infrastructure damage, a threat to people health
5	very high	high impact on facility, critical material losses, facility's functioning shutdown, infrastructure critical damage, critical threat to people health

PROBABILITY of the threat occurring (PR) The higher probability, when more likely can occur.

To be taken into account in the assessment:

- national terrorist threat level
- "attractiveness" of the shopping mall for terrorists
- potential media impact, obtained information (warnings)
- location, number of "symbolic" places susceptible to attacks presented in the shopping mall
- past incidents
- applied security and safety measures

Table 5: **Mall-CBRN Vulnerability Assessment Register - probability scale**
Source: Own source

PROBABILITY SCALE		
1	very low	very low level of terrorist threat, low "attractiveness" of the centre, lack of symbolic places
2	low	low level of terrorist threat, medium "attractiveness" of the centre, there are places of symbolic importance, in the past few minor security incidents
3	medium	medium level of terrorist threat, high "attractiveness" of the centre, there are places of symbolic importance, significant number of minor (or not-significantly serious) security incidents
4	high	high level of terrorist threat, very high "attractiveness" of the centre, there are places of symbolic importance, significant number of serious security incidents
5	very high	very high level of terrorist threat, critical "attractiveness" of the centre, there are places of symbolic importance, very high number of serious security incidents

To evaluate the risk analysis a five-grade scale was used to determine the level, with a score range from 1-25 resulting of multiplication of Impact and Probability factors.

Table 6: **Mall-CBRN Vulnerability Assessment Register - vulnerability assessment scale**
Source: Own source

1	very low	1-3
2	low	4-6
3	medium	7-15
4	high	16-22
5	very high	23-25

Finally, the security measures addressing the identified and assessed vulnerability can be presented in the form.

The recommendations should be presented to the SM management to take decision on the implementation or for further consultation with protection experts or public services before application.

7. PREVENTION

Creating risk awareness is key to making shopping malls safer public spaces. By carrying out a risk assessment, you can assess whether adjustments to your security plan are necessary. It is important that you understand the security plan and your role within it, and that you and your staff understand their roles and responsibilities with proper assignment, and systematic participation in training and exercises. Prevention activities are a series of protective measures and activities aimed at preventing incidents.

It is difficult to overestimate the role of prevention. Only proper preparation for a potential attack will allow for its effective counteraction. In an attack situation, there is no time to think about the best way to respond. Schemes of protection against the attack and reaction to it must be prepared and tested in advance. On the other hand, properly securing the object against attack is a factor that discourages attackers. They will tend to attack another, unprepared object.

7.1 Safety systems

Monitoring all activities in a shopping mall is crucial to maintaining order and overall control over the facility. This is why most shopping malls have fully operational security systems strategically placed to improve the level of protection of the facility. The possibility of a particular building becoming a terrorist target is generally difficult to predict. Consequently, there is no specific pattern to determine the level of risk for a particular building. No building can be fully protected against a determined individual who intends to disperse a CBR agent. However, facility owners and managers can turn their buildings into less attractive targets by reducing the vulnerability to a CBRN attack. This can be achieved by putting in place appropriate deterrents, detection measures to prevent the attack from taking place, slowing it down and by putting in place response plans and procedures to mitigate the effects of their release.

Decisions on what security measures should be applied to a building should be based on several factors. These are primarily based on the estimated risks associated with the facility and its customers, the technical and architectural feasibility, and the costs incurred to introduce or modernise them.

Some of the systems and solutions for shopping malls include:

- closed-circuit television system
- anti-robbery, anti-burglary systems
- ventilation and fire protection systems
- gate and barrier automation
- access control system

Security systems are a whole set of technical measures that can be used to protect against a terrorist attack using chemical, biological or radiological agents, but also to minimise the consequences of their use.

7.1.1 CCTV

In the digital age, video surveillance has become the most valuable factor in providing security in shopping malls and other public areas.

Most shopping malls install CCTV systems to monitor common areas such as food courts, pavements, walkways and car parks.

Some shopping malls also employ security personnel who monitor with cameras the situation in real time and carry out random checks within the shopping mall.

CCTV provides excellent image quality and provides security departments with a clear picture of the shopping mall's surroundings in real time and recordings.

Figure 63: **CCTV Control Room**
Source: https://www.fsmatters.com/Tavcom-adds-CCTV-courses-to-learning-portfolio [Access: 02.01.2023]

Nowadays, there are very advanced video surveillance systems that have greatly improved their optics and resolution. One of the most common questions is where to place security cameras in such centres. Obviously, considering blind spots, the appropriate location is crucial. Typically, a preliminary study of the CCTV audit in terms of the quality of the image from the cameras their number and placement, should be carried out to select the most convenient locations, such as access roads to entrances or elements sensitive to the operation of the shopping mall.

Extremely important places that should be monitored are technical corridors and evacuation corridors and staircases. This will enable better and faster recognition of potential danger. It will enable better management of potential evacuation and search for potential victims who may be there. Industry research shows that security cameras deter criminal activity while increasing the sense of protection for customers and employees. They are an effective management tool to help maintain quality standards, data integrity and operational efficiency.

State-of-the-art CCTV systems with advanced facial, abnormal behaviour, monitoring and left-object recognition functions are already available and implemented in many locations. Innovative software solutions make it possible to effectively identify the licence plates of suspect vehicles and provide an excellent example of cooperation between public services and shopping malls.

The solutions used create previously unattainable opportunities for detection and notification in the event of a potential CBRN terrorist attack or other hazardous event.

7.1.2 Access control

Access control systems are responsible for physically preventing an intruder from gaining access to protected premises.

Security measures in this group are based on advances in mechanics, mechatronics and automation, supported by telecommunications and signal transmission.

Access control is an important element in the physical protection of a shopping mall. It provides continuous protection, security for people, assets and sensitive information. Access control can be a simple or complex system, depending on the estimated threat to the facility.

Figure 64: **Example of access control unit**
Source:
Own photo

Access control is a common way of verifying people with access to their assigned area in shopping malls. Increasingly, systems for voice or fingerprint verification are being used, which dramatically improves security, especially in sensitive areas of the facility such as security, monitoring or management offices.

The main components of the access control system are as follows:

- security tokens (electronic ID card or biometric identifier, e.g. fingerprints),
- card readers (at access points)
- decision-making element (processor or computer)
- output (alarm signal used to inform in the event of unauthorised access powering the door lock, signal to cameras to take a picture when entering, barriers or other devices)

Some of the benefits of using an electronic access control system are:

- the possibility of connecting to doors that are electrically powered, thus preventing unauthorised access
- the possibility to collect and store all the data concerning persons who have gained access (person, time and place)
- the possibility of integrating with a CCTV system to increase the efficiency of access control
- the possibility of integrating with an alarm system that will alert security in the event of a security zone breach
- the possibility of opening any door to facilitate evacuation in the event of a CBRN event

7.1.3 Anti-theft/anti-intruder systems

The protection and surveillance of a facility, provided by property security systems, should be implemented in such a way as to prevent a potential intruder from gaining access to sensitive areas of the facility and achieving their intended attack targets. Intrusion detection systems (IDS) used to protect a facility are designed to provide the system user with information on the identification of a threat.

It becomes advisable to secure the facility in such a way that information on the detection of a threat occurs at the earliest possible stage of its formation, even before the intruder reaches his intended targets of attack. Such an organization of the alarm system enables effective security measures to be taken to neutralize the threat. It is also important to analyse the role of detection elements in individual security zones and to assess the effectiveness of an alarm system performing the tasks of an intrusion detection system.

Figure 65: **Example of anti-theft unit- a camera activated by movement sensor**
Source:
Own photo

Alarm systems are not designed to stop an intruder from entering a premises. Their purpose is to detect a threat and notify the user of it.

The parameter which determines the effectiveness of an alarm system is its response time to a detected threat.

Informing the user that an intruder has been detected may itself be a delayed action, as the user will not have sufficient time to react effectively. A security system should be able to detect an intruder's attempt to enter a facility even before the intruder has forced its way through the physical defence.

Although the mechanism of operation of security systems itself has not changed over the years, the techniques used in them have evolved with developments and advances in technology.

Nowadays, systems designed to limit or prevent an intruder's physical access to a protected asset are increasingly using computer and ICT techniques. These systems no longer allow not only the physical security of assets by controlling access to them, but also their observation and response actions in the event that a threat is detected. Such early detection elements can be motion detectors coupled with cameras.

And door opening sensors also coupled with cameras and automatic notification in monitoring. For this element it is necessary to create procedures for the operation of security on the signal of tripping the system.

7.1.4 Interlocking door system

Interlocking door system is off-the-shelf equipment or dedicated compartments whose primary purpose is to control entry to sensitive areas in shopping malls.

Dedicated compartment must already be designed at the construction planning level of the facility for areas susceptible to probable breaches of security rules.

Locks guarantee an effective barrier against violent intrusion and provide excellent protection against assaults with weapons or other dangerous tools. An indirect task is to isolate a person (e.g. an identified infected person) already inside an interlocking door compartment. The use of this type of room requires specific procedures for entry and exit from controlled areas inside shopping malls.

For effective operation and in order to meet the highest safety standards, the rooms or facilities in question shall additionally be equipped with the following:

- video recorders outside and inside the compartment
- an audio-visual system for communication
- appropriate resistance glass or doors solution
- a synchronised set of locks (entry and exit) - it shall not be possible to open the access door to the protected room before the lock is closed and locked
- biometric or other electronic access control systems
- automatic door unlocking system in the case of fire

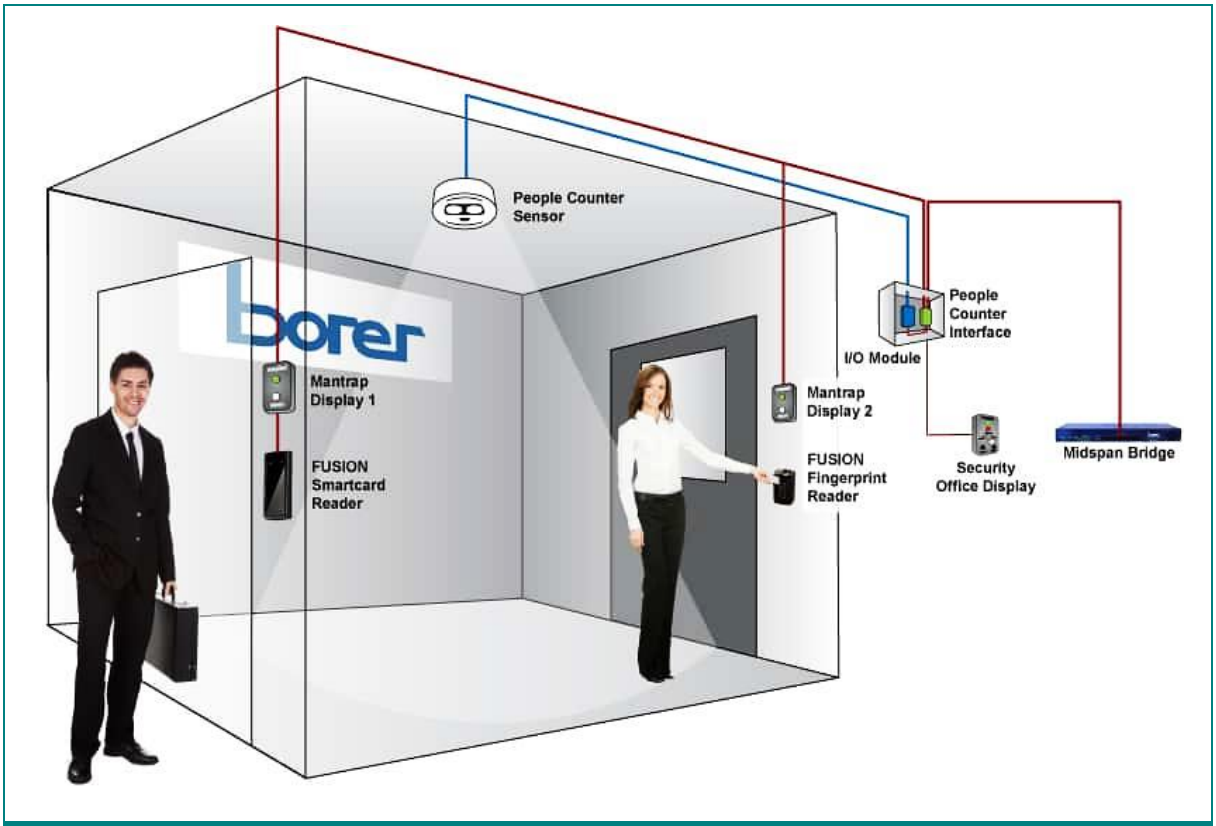


Figure 66: **Interlocking door system**
Source:
https://www.borer.co.uk/wp-content/uploads/2017/03/access-control-door-interlocking.jpg [Access: 05.01.2023]

7.1.5 Monitoring room

The security control room (CCTV room) is the centre of shopping mall security operations. This is where relevant information should be received and transmitted to and from security personnel (commanders, managers, first professional responders, both in routine and emergency situations). The CCTV room is also commonly used for surveillance of movement of delivery and passenger vehicles traffic. To achieve this, there must be a clear picture of the situation in the security control room. There must be access to data on all regular and irregular activities, crowd concentration and security incidents. From the security control room, it must be possible to prioritise and to filter relevant information, priorities security cameras showing sensitive areas, as well as alarm systems in a way that allows efficient response to situations.

A typical security control room should contain the main control stations for the security systems (CCTV, fire panels with graphic representation of the detectors, access control, burglar alarms, VAS - Voice Alarm System) installed throughout the building. The control room should also contain substations for several building management systems (BMS) such as air conditioning, lifts or mechanical ventilation systems. In order to maintain the continuity of the security control centre in the event of the use of CBRN agents, it is important to designate such a space outside the facility, based on neighbouring facilities with the ability to remotely manage the working environment.

Good design principles for such spaces include:

- design of the room as a dedicated facility, i.e. it cannot serve a double function, e.g. a detention room, storage of recordings, storage of lost items
- locating the room away from public thoroughfares (for customers and outsiders)
- location of the security control room away from installations that may affect its operation
- having a direct link to building management systems that are considered critical or security-related allowing security staff to fully operate these systems when the situation requires it
- adaptation of CCTV workstation, proper arrangement of screens and control consoles
- dedicating a separate external tele-phone line
- provision of a separate power line for security systems, independent of the power supply for other administrative equipment in the facility
- equipping the room with an emergency power supply and with appropriately selected lighting to meet the conditions of long-term work with CCTV monitors
- placing electrical equipment used by security control systems in a separate room

- installing in the security control room and associated room (if applicable) fire extinguishing agents which, when used, will not cause damage to the electrical equipment
- arming the entrance to the security control room with an access control system, a camera monitoring the door and the space in front of the entrance, a two-way voice communication system, intrusion prevention and assault protection systems
- equipping with a camera or system for monitoring the work of the security staff inside the room
- equipping with basic and specialized PPE personal protective equipment and initial decontamination kit

7.2 Anti-terrorist facility protection

Free access to a building from open spaces increases the risk of attack near critical building elements or in areas of mass gathering. Security barriers can prevent from a threat or intruder from approaching building facade and buildings critical areas. This is particularly important for more vulnerable building types, such as those with glass walls or doors. There are many ways to create physical barriers, including various types of fencing, barriers, walls, bollards or flowerbeds. The choice of barrier elements needs to take into account the desired level of resistance depending on the hazard (e.g. type of vehicle and speed of the vehicle).

Considering safety requirements in a comprehensive approach achieves a balance between multiple objectives, such as:

- eliminating or reducing risks
- achieving the functionality of the building
- achieving aesthetic and architectural requirements

Many security objectives can be achieved early in the design process, when they are least costly and easiest to implement. Developers, architects and landscape designers play an important role in identifying and implementing key asset protection measures, taking into account the orientation of buildings within the site and integrating vehicle access, control points, physical barriers, landscaping, parking and utility protection to reduce threats.

Physical barriers can be used to define the physical boundaries of a building and can help to limit, direct or impede access and create a continuous barrier around the site. Physical barriers also act as a deterrent to anyone planning to enter the site.

A vehicle entry restriction line is designed to prevent unauthorised vehicles from entering the site or approaching the building. It can include permanent or active vehicle barriers such as bollards, raised steps, concrete walls, etc.

Vehicles can pose significant safety hazards due to their payload, weight and speed. These hazards include:

- delivery of large quantities of hazardous materials
- ramming attack
- ramming and breaking through the fence line by armed assailants

The first consideration when planning a vehicle perimeter line is to reduce the number of places where a vehicle can pass through the perimeter line. To do this, it is important to ensure that the perimeter line is not close to roads or other areas where vehicles may approach. As VSBs typically require foundations and structural works, they should be considered at an early stage in the design of the facility.

The selection and design of vehicle safety barriers must take into account the context of the site. This is especially important when physical safety features are proposed in public spaces or areas that are intended to be accessible to the general public. In such cases, designers should take a comprehensive approach to ensure that appropriate measures are taken to achieve the required level of safety. At the same time, the ease of pedestrian movement or use of public spaces must not be adversely affected. Designers should ensure that the physical safety elements are effectively and seamlessly integrated into the streetscape design, to meet safety requirements while creating a pleasant public space.

Bollards

These are small posts used to create safety or architectural barriers. They primarily act as visible indications of traffic routes, directing traffic and marking boundaries. As landscaping elements, they are available in many different shapes and distinctive designs.

Bollards can be made of almost any material, including, but not limited to, most commonly metal, stone, plastic, cement. Bollards can also have a design that physically blocks the entry of vehicles or protects people and property.

There are also solutions such as hydraulic automatically extendable bollards, which act as anti-terrorist barriers for vehicles, with the possibility of hiding them completely in the ground to allow vehicles to pass at points of entry and, in the event of an emergency, lifting them in a short time, blocking passage. This solution also allows pedestrian traffic to be maintained.

Figure 67: **A bollard**
Source:
Own photo

An alternative to guard posts is a concrete landscape element such as concrete flowerpots, large benches, other suitably heavy and anchored landscape elements, hardened to stop vehicles.

It can accommodate plants or other decorative elements, making it an aesthetically pleasing alternative to bollards.

It is installed partly below ground and partly above ground and can be part of a landscape design.

Anti-terrorist vehicle barriers

This type of security device is divided into several types depending on their mode of operation. They are installed at the entrances of vehicles to internal areas. They can be operated manually, automatically, pneumatically, electromechanically or hydraulically.

Their primary purpose is to stop a terrorist attack using a vehicle travelling at high speed from entering the premises, to prevent people gathered from being run over and to prevent explosives or other dangerous substances being brought into the premises in large quantities.

Figure 68: **A movable anti-terrorist vehicle barrier- to build barrier in desired location depending on the situation**
Source:
Own photo

Reinforced landscape objects

Structurally reinforced walls can be used effectively as part of protection against attempted ramming. They can be retaining walls, edges of yards, raised kerbs, an extension of building architecture or the base of a fence. It is essential that the foundation of the wall is continuous. Such walls are usually used in conjunction with other barriers.

Figure 69: **Reinforced landscape objects**
Source:
https://perimetersecurity.group/anti-ram-walls/

7.3 Emergency equipment

In order to respond efficiently, safely and effectively to emergency situations, in addition to knowledge of the procedures in place, additional emergency equipment is required for the facility's security management staff.

A well-designed, equipped and correctly located package will greatly enhance the effectiveness of the alarm activities carried out. Personnel responsible for coordinating alarm activities should be familiar with its contents, location and trained in its use.

Personal Protective Equipment (PPE)

PPE is individual, specialized equipment and clothing for workers that will provide protection against hazards (e.g. chemical agents, infectious agents and toxins). General work clothing (such as coveralls, trousers, work shirts) are not considered as PPE. There is a range of clothing available to protect against CBRN agents. The use of the specific PPE is determined by a risk assessment, while to counter the effects of a terrorist attack with CBRN agents, the aim should be to protect as effectively as possible against all possible scenarios.

When selecting appropriate PPE, size is a very important criterion. Choosing the right size of equipment ensures that its properties are maintained. Further factors influencing the effectiveness of protection are the use of compatible PPE (masks, goggles, suits, gloves), proper fitting and sealing of the connections so that they form a tight unit, proper training in dressing and undressing. All necessary data regarding CBRN PPE equipment are widely described in chapter 8 – Protection.

Additional emergency equipment

The emergency equipment should also include measures to ensure the efficient management of safety during emergencies that occur, such as:

- alarm instructions
- additional individual lighting
- chemical lights - for marking zones, safe and dangerous (green/red)
- emergency communication kit
- reflective safety wests with emergency instructions
- pre-medical first aid kit
- initial decontamination kit
- warning tape
- reinforced duct tape
- thermal blankets
- biological waste bags or CBRN waste bags

Essential equipment
Recommended R-1 Medical Rescue Bag with accessories

Equipment in the kit:

1. Oropharyngeal tubes
2. Self-expanding bag with rotating face mask
3. Cervical collars
4. Splint rails
5. Aluminium foil
6. Cooling and soothing bandages
7. Hydrogel bandages
8. Dressing kits

Supplementary kit includes:

9. Nitrile disposable gloves
10. Plastic waste bag
11. Hand disinfectant liquid
12. Rescue scissors
13. Belt cutter
14. Plastic sheeting to cover the body

Figure 70: **R1 Medical Rescue Bag**
Source:
https://www.sklep-omnibus.pl/torba-medyczna-r1-rescue-bag-1-pusta-p-436.html [Access: 05.01.2023]

„Grab Bag" Evacuation bag with recommended accessories

Grab bag includes:

1. Checklist of activities to be checked/executed in the zone
2. Evacuation plans and floor/zone plans (laminated) including the location of gas, electricity, and water cut-off points
3. List of contacts (laminated) with staff, main office, emergency phones (including specialized services), etc.
4. Incident book (consider dictaphone), notepad, pens, markers, etc.
5. Basic First aid kit
6. Torch and spare batteries
7. Light sticks (chemical lights) - red and green
8. Radio or spare battery
9. High visibility vests
10. Megaphone and spare batteries
11. Warning and cordon tape
12. Aluminium blankets and waste bags
13. Dust/toxic fume escape masks
14. Safety goggles, and heavy-duty gloves

Figure 71: **„Grab Bag"**
Source:
https://evaq8.co.uk/Emergency-Workplace-Kits/workplace-evacuation-kit-20-persons.html [Access: 05.01.2023]

Bag for initial decontamination with accessories

Suggested equipment for a minimum of 40 people in various sizes:

1. Hooded ponchos
2. Cotton slips
3. Knitted socks
4. Plastic shoes (e.g. beach flip-flops)
5. Protective respirators
6. Identification bands with individual numbers
7. Plastic bags for contaminated clothing (capacity min. 100 l, sealable and labelled like a band)
8. Plastic bags for personal items (capacity min. 20 l, closed and labelled like a band-aid)
9. Disposable gloves
10. Moist non-woven towels
11. Moist sanitary gloves for body wash
12. Plastic bag for the kit

Figure 72: **Bag for initial decontamination**
Source:
Own photo

Command and control escape case

The escape suitcase concept is based on the ability to manage a complex (shopping mall) in a situation where emergency personnel are evacuated outside the facility. An evacuation dictated by a CBRN incident will skip the steps of rechecking already evacuated, potentially contaminated areas where people in need of assistance or hiding from a complaint could remain. This type of solution will also simplify the task of the arriving emergency services in terms of coordination.

Figure 73: **Command and control escape case – external view**
Source:
Own photo

Example content of escape case:

- laptop with software for remote connection to the shopping mall's CCTV system
- architectural plans of the shopping mall
- radios used in the shopping mall have communications coverage throughout the shopping mall
- access cards and keys to areas and rooms
- fire safety instructions
- security procedures

Figure 74: **Command and control escape case – internal view**
Source:
Own photo

Figure 75: **Command and control escape case – content**
Source:
Own photo

Additionally:

- additional individual lighting
- chemical lights - for marking zones, safe and dangerous (green/red)
- reflective safety wests with emergency instructions
- initial decontamination kit
- warning tape
- reinforced duct tape
- thermal blankets
- biological waste bags or CBRN waste bags

8. INFORMING AND NOTIFYING

Due to the nature of an incident involving CBRN agents, adequate information and notification is a very important element.

Persons without specialized equipment and training should not be directly involved in providing first aid and countering the effects of these agents. Therefore, always emphasize the nature of the incident when informing and notifying, so that those responsible for coordinating the alert and notification activate the appropriate resources, adapted to respond to such incidents. It is crucial, in response to CBRN incidents, that the relevant (specialist) services are notified of the nature of the incident. Otherwise, units not prepared for this type of action will be dispatched to the scene, which may result in additional casualties and loss of time necessary to provide first aid and initiate decontamination procedures. Therefore, facility security, management and tenants should be trained in proper information and notification.

Good information management and efficient notification are key elements when it comes to shopping malls security. Information management as well as notification should start with the corporate management culture. This is where the direction and level of security procedures and rules should be set and implemented, which directly translates into the ways, methods, and scope of notification and information in the area of security at individual shopping centres.

There is a subtle difference between notifying and informing, in fact, the definitions given below distinguish not only the area and time of the information provided but also indicate how to proceed once the information has been received.

1. **Information** - is understood as the distribution of messages about how to prevent risks, what to do in the event of a risk and once the risk has ceased, including the possibility of obtaining assistance to deal with the consequences of the risk. (Mostly prevention or reporting)

2. **Notification** - the communication, by all available means, of specific information to alert the competent authorities and the population to the possibility of a hazard, its occurrence, or its cessation, and to provide information on how to deal with it. (Emergency response)

Information

In the case of shopping centres, we can distinguish between different lines of information dedicated to specific audiences and carrying different information content:

Internal	External
1. Dedicated to shopping centre employees, security services, tenants, and superior management units - regarding: • changes in security procedures • changes related to the organization of the facility • information on potential risks • information on possible disruptions such as power cuts • implementation of new systems affecting security 2. Dedicated to customers - in terms of: • security in car parks • evacuation	1. Dedicated to emergency services - in terms of: • training and training needs • needs related to content and practical support during occasional events • adaptation of systems to the needs of services in emergency situations 2. Dedicated to cooperation with industrial plants posing a potential risk in the event of an accident, natural disaster, or terrorist attack 3. Dedicated to cooperation with authorities supervising the transport of dangerous goods in the vicinity of a shopping centre 4. Dedicated to shopping centre organizations - in terms of: • communication of potential threats including - threats, extortion attempts, and intimidation • effective solutions and practices developed that have a significant impact on improving security

	5. Dedicated to the wider public in terms of informing the media about the situation and actions taken after the occurrence of crisis events 6. Dedicated to the city's crisis management institution

Notification

In critical situations, it is advisable to have an emergency notification plan to facilitate prompt and timely communication.

Often, it is the retail facility manager who must take responsibility for managing communications in the event of an unwanted emergency in their shopping centre.

As with information, notifications can be divided into two groups and dedicated to particular target audiences:

Internal	External
1. Dedicated to shopping centre employees, security services, tenants, customers, and superior management units - in terms of: • notification of the occurrence of an emergency within the boundaries of the facility - see. EVACUATION ANNOUNCEMENT, • actions necessary to minimize the consequences, • actions necessary to remove obstacles occurring during evacuation operations, • the coordination of security activities, • organization of the work of the emergency response team.	1. Dedicated to the emergency services - in terms of: • alerting of the occurrence of the event - see. METHANE • notifying emergency services of the state of the situation upon their arrival on site.

Various forms of information and notification are used to effectively reach the designated beneficiary groups and make use of both technical and traditional means:

1. Information signs and instructions
2. Digital radios - treated as the main or backup communication between the administration, security service, and other employees. The proper operation of a radio communication system depends on factors such as:
   - independent radio frequencies
   - site-wide radio signal transmitters
   - encryption, to counteract the possibility of radio interference
3. GSM communication - as the primary communication with tenants, external entities, and emergency services using GSM technology. This solution guarantees fast access to selected customers but has the disadvantage of losing connectivity when BTS base stations are overloaded. In the case of emergency events, the risk of overloading is very high
4. WI-FI communication - guarantees a stable connection between the administration, security service, and other employees, but only within the boundaries of the facility. A very useful feature of professional access points is the possibility for a single device to create several networks with different SSID names and different permission levels. This makes it possible to provide an open and free network for anyone with limited technical parameters (e.g., bandwidth), a separate network for authorized users, and a closed network for internal purposes, e.g. for employees of the facility
5. Telephone communication - wired communication so-called "hard link" is the most stable type of communication, least exposed to external factors, and used most often to maintain communication between key elements of safety management in a shopping centre
6. VAS - voice alarm system - according to fire regulations. - a mandatory system for announcing warning signals and voice signals for the safety of all persons within the boundaries of the facility
7. Communicators - WhatsApp, Signal, etc. Applications are used to group recipients by segments, such as location or type, so they can be notified of events or critical situations that affect them
8. E-mail - mainly used to share experiences, communicate changes that have occurred, or report on historical events
9. Sirens and alarms
10. Dedicated applications:
    - applications of this type provide the opportunity for rapid, two-way emergency notification to management, security, staff, and tenants
    - applications for employees and tenants with disabilities

It should be emphasized that a well-designed and structured notification and information system must be combined with training and drills for tenants as well as for shopping centre employees. An example would be the procedure for creating a safe place from the effects of a chemical agent attack. Through an app, tenants can be instructed to implement a 'shelter-in-place procedure, but without prior training, this will not have the desired effect.

It is recommended that tenants are informed of the general level of national as well as local security, which will influence their situational awareness as well as the possible manner and speed of response to a real threat. Facility managers should not be afraid to use tenants to observe or disclose dangerous situations or objects within their premises and the shopping centre. Such management-tenant cooperation can only be beneficial and will improve safety.

Recommendations

For the security system to operate efficiently, it is essential to obtain information quickly and efficiently and to transfer it further, therefore following solutions are recommended:

1. Equipping security staff with encrypted radio communications based on digital radios to exclude external interference of the information stream
2. Providing the shopping centre with comprehensive radio signal coverage, with transmitters and signal amplifiers (modern digital radios can double as signal amplifiers for other transmitters)
3. Organizing alternative communications, e.g., own WiFi network, which will enable the efficient transmission of information to the mobile phones of shopping centre employees and tenants
4. Securing additional sim cards from other GSM network operators than those used on a standard (daily) basis
5. The implementation of a smartphone app in the shopping centre for quick contact with tenants and employees (such applications are already in operation in many shopping centres). Apps of this kind offer the possibility of rapid two-way notification of threats to all authorized access groups
6. The use of mobile applications that make it possible to notify people with verbal communication difficulties (people with hearing impairments) in a graphical way. - e.g. the Alarm 112 application
7. Preparing a list of the most important emergency telephones for security services, including those responsible for CBRN security in your area
8. Setting up an information cell to be in contact with tenants and property owners, corporate headquarters, customers, or their families during and after an incident

Below is an example of the chain of notification of a hazardous incident, together with the responsibilities and activities of the position.

Basic behaviour of SM functionaries according to their position in the security management chain:

First line security, SM technical staff, tenants and shop staff:

1. Situation recognition:
   - where, the exact location of the incident
   - how many persons affected
   - the nature of the incident, e.g. unconscious, vomiting, strange chemical smell
2. Transmission of the above information to the monitoring room, security centre
3. Securing the area in order to prevent unauthorised access
4. Secure themselves with available personal protective equipment, e.g. gloves, masks, goggles,
5. If possible, pulling injured persons out of the hazardous area in accordance with safety procedures. Such action is only possible if:
   - there is a certainty that there is no immediate danger to the responders
   - the responders have personal protective equipment appropriate to the hazard

Monitoring personnel:

1. Situation recognition - analysis of recordings of incidents in the area (causes of symptoms and source of threat)
2. Monitoring the scene of the incident
3. Informing and notifying security managers and emergency services

Security manager/shift manager:

1. Analysing the situation
2. Inform the SM management on the nature of the incident
3. Prepare for evacuation within their area of responsibility
4. Informing the appropriate services about the incident and its nature
5. Notify the emergency services indicating a suspected CBRN incident
6. Supervising and coordinating the evacuation until the arrival of the emergency services

Management:

1. Analysing the situation with regard to CBRN risks
2. Notification of the relevant services of the incident and its nature
3. Preparation for evacuation
4. Decision on evacuation of the facility
5. Supervision of the evacuation

When informing and notifying the emergency services, it is important to indicate a safe access route and egress.

Dangerous item threat information

Information on the planting of a dangerous item using a CBRN agent. Receiving a notification that a dangerous object has been planted, places a high psychological burden and can be a traumatic experience.

Therefore, the development of procedures and procedural training can enhance the incident management.

The information of the intention to plant or set off an dispersal/explosive device may be obtained:

1. By providing information by telephone
2. By sending information by e-mail
3. By mail or by dropping off in a conspicuous place - a letter, a postcard
4. By dropping off a leaflet, piece of paper, for example in a toilet, corridor or other visible and generally accessible place in the institution
5. Making a short inscription: with paint, lipstick on a window, toilet mirror, wall, etc.
6. It can also be a person who, while in the premises of an office or institution, announces that he or she has an explosive charge on him or her, in a briefcase or in his or her hands, and will detonate/disperse the charge if his/her demands are not met

Information about a planted explosive device must be forwarded immediately to the staff responsible for security, to the management and to the Police.

When interviewing a person reporting the presence of a dangerous charge, the form provided in the Appendix VI may be used.

THREATENING INFORMATION FORM

1. Received call date (day/month/year):_____
2. Caller phone number: _____
3. The call was probably: ☐ cellular ☐ landline ☐ local ☐ long distance
4. Time: call start time:_____ call end:_____
5. Caller's sex: ☐ Male ☐ Female ☐ Minor
6. Caller accent: ☐ Native ☐ foreign language ☐:_____
7. Caller age (approx.): _____
8. Was the callers voice familiar to you?: ☐ No ☐ Yes: _____

Check for key words.

☐ Chemical	☐ Biological	☐ Radiological	☐ Nuclear	☐ CBRN
☐ Nerve	☐ Blister	☐ Choking	☐ Blood agent	☐ NBC
☐ Detonation	☐ Dispersion	☐ Explosion	☐ Liquid	☐ Gas
☐ Aerosol	☐ Acid	☐ Alkali	☐ Powder	☐ Detonator
☐ Fuse	☐ Initiation	☐ Trigger	☐ Switch	☐ IED
☐ Booby trap	☐ Bomb	☐ High explosives	☐ Trip wire	☐ Time delay
☐_____	☐_____	☐_____	☐_____	☐_____

9. **Information obtained (try to write down exactly what he said):**

_____

_____

_____

_____

_____

_____

10. **If possible ask questions (stay calm and polite):**

When it will be activated?:_____

Where is it planted?: _____

What kind of device is it?: _____

How does it look like?:_____

What is dangerous distance?:_____

What does it produce?:_____

What will cause when activated?:_____

Thank you, that you called. But why did you call?:_____

Who are you?: _____

Why are you doing this?:_____

What should I do?:_____

Try to hear the background noise:

☐ Traffic ☐ Voices ☐ Technical noise ☐ Trains ☐ Office

☐ House noise ☐ Silence ☐ Shopping mall noise ☐ Bar ☐ Street voice

☐ Siren ☐ Aircraft ☐ Kids ☐ public address systems

☐ Animals ☐ Other:

_____

_____

11. **How the caller behaved and spoke:**

☐ Aggressive ☐ Calm ☐ Emotional ☐ Rational ☐ Irrational

☐ Frightened ☐ Drugged ☐ Fast speaking ☐ Drunk ☐ Slow Speaking

☐ whispering ☐ Normal ☐ Rude ☐ Bot ☐ Recorded voice

☐ Other:

_____

_____

12. Your personal data:

Name: _____

Position:_____

Time and date when completing the form:_____

Figure 76: **Example of THREATENING INFORMATION FORM**

Source:
Own source

During a face-to-face or telephone conversation, demonstrate maximum calm and composure and seek to obtain as much detail as possible about the threat and the person providing the information. Any detail remembered from the conversation or an extension of the conversation may have a significant impact on the subsequent investigation.

Communicate the information obtained immediately to the mall management, detailing the content of the conversation and the place, time and source of the information.

If the information is received after working hours or outside the workplace - the employee should immediately pass the information obtained to the mall management in person or by telephone.

When completing the form:

1. Underline the relevant information
2. Fill in during or after the interview simultaneously (recording if possible)
3. Keep the conversation calm and polite
4. Pretend to have difficulty understanding the caller and try to prolong the conversation
5. Make the caller aware of the possibility of causing, as a result of the attack, the death of innocent people who happen to be in the place where the device will be activated
6. During the conversation, seek to obtain as much information as possible about the reporting party and his/her motives

9. EVACUATION

9.1 Introduction

Evacuation of people from shopping mall after CBRN attack or accident is the most important procedure among all the procedures provided in this book. Proper evacuation leads to shortening exposure time and reduce number of exposed people which means lower number of fatal casualties, less severe injuries, lower dispersion of the agent etc. Evacuation after CBRN accident differ from other types of evacuation. Effects of attack could not be visible thus improper route of evacuation is more possible than in other ones (like during fire) which could make situation significantly worse. This is way it is very important to under-stand evacuation principles, organization, responsibilities, phases and to exercise it cyclically.

In most venues there is already evacuation plan, it should be updated with information and action specific to CBRN attack or incident instead of creation of new evacuation plan dedicated only to CBRN. This approach creates perception that CBRN incidents are one of possible threats we have to take into consideration. Creation of new security documents (informing plan, evacuation plan, training plans) could lead to neglecting them if no such incidents happens. Because of complexity of the procedure and its importance evacuation plan should be carefully prepared and checked periodically for its applicability and effectiveness.

9.2 Evacuation principles

Evacuation is a process of elimination of exposure to the threat/risk to the people be removing them from dangerous location.

Successful evacuation should be:

1. Fast – the shorter exposure to the threat (in this case to CBRN agent) the lower risk of contamination or poisoning and less severe effects of contamination

2. Complete – all the people should be evacuate or all the people needed instant evacuation (see shelter in place)

3. Safe – organization of evacuation should be safe to the visitors and workers of SM, which includes safe routes of evacuation (extremely important for CBRN evacuation), use of dedicated equipment including PPE

4. Managed – people responsible for evacuation have to know what to do at every stage since announcement to arrival to the dedicated rescue services (firefighters, Police EMS etc.), including management of the people at assembly points

9.3 Evacuation plan

The evacuation plan is designed to prepare information for employees and tenants to evacuate the building as quickly and safely as possible. In order to ensure that employees are sufficiently prepared, these plans must cover all relevant scenarios of possible crisis situations. Emergency situations can include everything from natural disasters, industrial accidents, transport accidents, terrorist attacks, structural failures, or fires.

WHAT SHOULD AN EVACUATION PLAN CONTAIN?

Define the roles and responsibilities of functional staff. When an incident occurs, employees and tenants will expect instructions from their leaders on exactly what to do in the situation. Create a clear chain of command including who has the authority to decide, coordinate and lead an evacuation in the shopping centre as well as specific areas.

Basic roles to be considered for the creation of an evacuation plan:

- Evacuation manager – the person responsible for analysing the situation and making decisions to evacuate, monitoring external conditions (change in wind direction, temperature)

- Evacuation co-ordinator – the person who co-ordinates the whole process from the time of the announcement until the evacuation is handed over to the public/emergency services
- Emergency response team – designated staff, their roles and responsibilities
- Monitor – the person responsible for supervising the technical and video systems from the operator level through the entire evacuation process,
- Functional staff – individuals supervising an area, floor, or car park including tasks provided for tenants as part of an evacuation in their own areas
- Route leaders – those who play a vital role in providing assurance that routes and exits are checked and safe, and that evacuation is carried out in an ordered and calm way
- Fire safety officer – role and responsibility for a fire incident
- First-aider – the person responsible for providing qualified first aid
- Liaison officer – a person designated to contact public services or other recipients in the event of loss of communication
- Communication team – the people or person responsible for communication with the media

Steps for developing an evacuation plan:

1. Develop various options for dealing with different hazard

In order to develop an effective evacuation plan, start with some basic questions to develop a pattern of responses to the primary and extraordinary hazards that your shopping centre may face.

What if "X" happens?

Develop a list of 'What if X happens' questions and answers. Let 'X' be a representation of all the defined risks. Consider different extreme scenarios. Thinking through the different scenarios allows you to create an action plan.
This exercise also helps to raise any safety incident to the level of collective awareness in your working environment.

2. Identify schemes of action in each zone

In the case of a shopping centre, make floor plans or diagrams of the premises and then inform all functional staff so that they know their evacuation routes. Best practice also requires the development of a separate evacuation plan for people with disabilities. A good evacuation plan will also include primary and alternative escape routes.
Mark all escape routes, fire exits, and special places (first aid kits, escape bags) with clear signs. Describe in detail the tasks and roles of the functional staff in their zones with a detailed division of all evacuation phases in the zone.
Designate a safe assembly point for dedicated zones taking into account hazard options (e.g. CBRN). Finally, confirm that evacuation routes and assembly points can accommodate the expected number of evacuees. Each plan should be unique to the individual zones, and floors to which it is dedicated.

Develop a plan for the organization of the evacuation assembly point, and designate the location, equipment, and person responsible for the medical assistance and initial decontamination station.

3. Create a communication plan

During the development of the plan and evacuation drills, establish a main and backup communication plan for internal and external use, and define the available means of communication, radio communication channels or telephone numbers.
You should also appoint a liaison officer whose main responsibility is maintaining contact with the fire and emergency services and disseminating information to key stakeholders, including employees and customers, in the event of a loss of communications. If necessary, assess whether your crisis communication plan should also include contacts with the local community, suppliers, transport partners, and government officials.
The ability to send notifications via email, phone, text messaging, and the mobile app provides the opportunity to reach everyone in the building using preferred and secondary communication methods - allowing the widest possible distribution of messages. It also allows the fire and emergency services to reach the site as quickly as possible.
In the case of post-threat response, the communications team will need to communicate to relevant stakeholders how the situation affects the company, what actions they should take, and what the next steps are.
Remember: lack of communication creates rumours. Your employees have mobile phones. They are a potential source of such rumours.

4. Check your tools

Create a schedule to confirm that emergency equipment is up to date and functional, including:

- megaphones
- fire extinguishers
- means of communication
- first aid kit equipment
- escape bag equipment,
- recharging the batteries of torches, radios
- periodic check of other alarm equipment

5. Practice the evacuation procedures

The evacuation plan should include a detailed guide as to when for whom and in what form to conduct the drill.
Running regular evacuation drills minimizes any confusion and helps to observe how the various evacuation steps should work and ultimately reduce the risk of panic in the event of a real emergency.
Hazards spread rapidly and often second can be decisive - so it is essential to prepare and train at designated positions at an individual level before a potential evacuation.
Key figures for the evacuation process should meet quarterly and should plan annual or half-yearly training at different levels of operation for different incident scenarios.
Coordinate the evacuation plan in advance with the police, emergency services, local authorities, and neighbours. Be sure that staff with specific responsibilities are trained and that all staff has had their training drills. Also, remember to inform the police of the action taken during any incident.

9.4 Phases of evacuation

Evacuation is a quite complex action, it consists of three phases:

I. Planning and decision making phase
II. Managing evacuation
III. Assembly points management

First phase is about preparation to the incident including creation of evacuation plans, preparation of assembly points and equipment needed, provision of training to the people involved in the evacuation process. In some cases, especially if the CBRN agent release is sudden, on evacuation route or in front of the tenants' venue, it is better to stay at the place and wait for help. This decision is not easy and obvious and several factor should be taken into account this is why should be considered prior an incident.
As preparation to the incident is a constant process it could be said that this phase is ongoing and ends with evacuation announcement.

Second phase describes management of the evacuation process and actions to be taken during different stages of evacuation. This phase, due to it's complexity is divided int three stages:

- The first stage is related to the movement of people from the rooms/spaces of the shops towards the exits to the evacuation routes.
- The second stage is related to the movement of people along the escape routes to the emergency exits of the building.
- The third stage is the exit to the outside of the building and the movement of people to the assembly point or outside the premises.

Third phase of evacuation is focused of management of the people at assembly points till the arrival of rescue services.

Evacuation - Phase I

Conditions for ordering evacuation in CBRN events:

- information about a planned terrorist act, e.g.: planting an explosive device or a dangerous agent dispenser
- an event posing a threat to the health or life of the persons present (e.g.: emission of toxic or explosive substances)
- fire alarm or fire leading to the release of toxic substances or heavy smoke

Evacuation or shelter in place - decision making process

In regions where there are industrial plants using hazardous substances in the production process, close to roads and rail infrastructure used for the transport of dangerous goods and cargo, a decision-making system for preventing and responding to violent incidents is needed.

In particular, toxic substances in gaseous form and other CBRN agents may be released in nearby public places. In some cases, the spread of toxic gases, aerosols in the air is very rapid and evacuation to distant safe areas is impossible. Therefore, it is necessary to develop a situation assessment system to establish an appropriate emergency response strategy.

It is necessary to establish internal evacuation mechanisms/procedures, taking into account the technical infrastructure (ventilation system, fire barriers, other technical infrastructure), the adjacent area and the prior development of potential incident scenarios.

The evacuation plan plays a key role in safety management, at the time of the emergency and during the implementation of the evacuation process.

In order to develop effective evacuation strategies outside buildings, weather conditions, the direction of the spread of contamination should be assessed first and foremost. The organisation of operations inside the facility should focus on estimating the optimisation (orientation) of evacuation routes, as far away from the incident as possible, in a safe direction.

Only a limited number of studies have proposed an emergency response decision-making tool to rank plausible accident scenarios, identify hazard levels and define emergency action plans accordingly.

Successful evacuation allows people to be removed from the affected area and avoids their exposure to harmful concentrations of hazardous substances.

An inappropriate evacuation decision can have negative consequences if people are moved into a contaminated area or an area where the contamination enters (e.g. according to the direction of the wind).

Sheltering in place may prove to be a worse option than evacuation if shelters are leaking /improperly prepared, people are not informed of their presence, there is a lack of information on when they are to leave shelter or the exposure to toxic substances lasts for a long time.

Decision-making process on a selective evacuation plan in the event of an incident inside a building without the possibility of evacuation by alternative routes should take into account the following parameters:

- remaining time to contact with contamination
- distance from incident site

Similar assumptions can be made for the occurrence of an incident outside the facility with the option of sheltering in place in the building.

The decision support matrix therefore provides for two types of response:

- evacuation (please keep in mind that if threat is coming from outside evacuation could be directed towards inside of SM- it is called invacuation)
- shelter in place

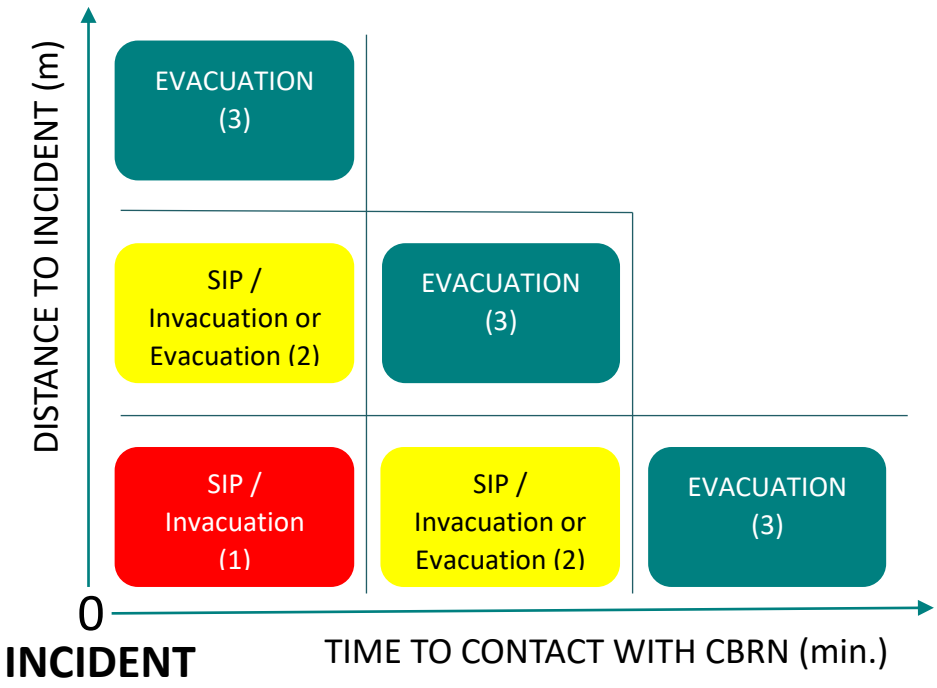


Figure 77: **The diagram of decision making depending on distance from the threat and time available**
Source: Own source

The X-axis was defined as a time parameter, depicting the spread times of hazardous chemicals in the facility. The Y-axis was divided into distances from the incident site.

In order for the decision-making process to be effective, it is also important to assess the rate of diffusion of hazardous gases in an enclosed space. The further away we are and the more time we have before the contamination reaches us, the more effectively we can safely evacuate people out of the affected facility.

This decision-making matrix can be used when:

1. Shelter in place. Diffusion time for hazardous materials is rapid and evacuation time insufficient.

2. Shelter in place or evacuate. The diffusion of hazardous materials is not very fast (evacuation time is sufficient), the distance to the hazard is also sufficient for evacuation. In this case, other factors such as people with disabilities, young children, problem with the capacity of emergency exits may influence the decision to shelter in place.

3. Evacuation (or invacuation) depending on the location of the contamination source – inside or outside).

Evacuation is possible because the distance to the incident and the time needed to evacuate people outside the facility is sufficient or the speed of spread of the contamination is not high.

The evacuation decision must include:

- information on its coverage
- identification of evacuation routes and areas designated for evacuees
- information on how and in what order to leave the area

PREPARATION FOR EVACUATION

In the case of situations involving a suspicious, unidentified object and an expected evacuation announcement, the staff involved in the evacuation process should be initially informed of the situation.

This uses code words such as: "CODE 101", given by the VAS system or internal means of communication.

Pre-evacuation actions:

1. Collect the necessary equipment to guide the evacuation, e.g.: reflective vests, means of communication, torches, personal protective equipment
2. Check evacuation routes for safety in particular:
   - choking points - corridors, passageways or exits
   - rubbish bins, flower pots
   - permeability of escape routes
   - permeability of emergency exits
3. Check the designated assembly points
4. Prepare equipment to organize assembly points e.g.: medical bag, thermal blankets, water, megaphone for crowd control, initial decontamination kits
5. If possible, check fire roads or access routes for public services
6. Take up positions and directions in assigned areas according to the evacuation plan
7. Keep people out of the danger area

EVACUATION ANNOUNCEMENT

The transmission of the message should be preceded by a special signal to draw the attention of the listeners or a verbal announcement "PLEASE ATTENTION!" with a gap of 4 seconds between the announcement and the message.

Announcement or warning signal and the message should be broadcast sequentially until changed in accordance with the evacuation procedure or manually muted.

The message transmission structure according to EN60849 is as follows:

Warning signal	pause	Announcement	pause	Sequence repetition
4-8 s	**5 s**		**2-5 s**	

Evacuation announcements should be made using the Voice Alarm System (VAS).

The system used, should provide the possibility of automatic broadcasting of emergency signals in the event of the detection of a hazard or its occurrence.

Independently of the automatic activation of the system, it should be possible to broadcast "live" messages using a microphone in the security room. This system should have priority over other public address equipment and should ensure that hazard messages are also broadcast in foreign languages (e.g. English).

Method of evacuation announcement

The evacuation announcement message should include:

- information on the decision made as to the type of evacuation (shelter, shelter or evacuation, evacuation),
- identification of directions for safe passage to assembly points,
- dangerous parties/directions/entries,
- prohibition of the use of underground car parks.

If the decision is made to evacuate, an announcement should be made, an example of the following:

"ATTENTION, ATTENTION, ATTENTION! THREAT HAS BEEN DETECTED AT THE FACILITY. PLEASE PROCEED TO THE NEAREST EMERGENCY EXIT. AVOID ANY CLOUDS, SMOKES OR AREAS WITH UNUSUAL ODOURS. PLEASE REMAIN CALM IN YOUR DESIGNATED EVACUATION AREAS".

Evacuation - Phase II

Phase II consists of three stages:

- stage one - evacuation from premises
- stage two - evacuation by emergency routes
- stage three - moving to assembly points

Before each of the stages are described general evacuation principles and rules of evacuation execution are provided.

EVACUATION EXECUTION

Evacuation organisation:

1. All actions related to the evacuation process should be included in the "Evacuation Plan"
2. The authorised person to make the evacuation decision before the arrival of the emergency services is the facility administrator or in his/her absence the person designated by him/her, or any other person designated in accordance with the country internal regulations or given organization concerned
3. The director/administrator of the facility or their designated person for the duration of the evacuation shall act as the evacuation coordinator

4. The location of the emergency command post or alternate location of the emergency COMMAND POST shall be determined by the evacuation plan
5. The organisation of the evacuation in individual sectors and the supervision of evacuees at the assembly points shall be carried out by the designated functionaries
6. Persons with appropriate training are designated to provide premedical assistance

A critical element to undertake a proper and effective evacuation response is to ensure that there are enough functionaries in accordance with the evacuation plan.

These persons should be trained in their duties at their designated points /assignments and receive regular training.

Tasks of those responsible for organising the evacuation:

1. The administrator makes evacuation and other decisions related to providing security during the evacuation process
2. The administrator appoints, if necessary, an emergency response team consisting of functional personnel necessary to improve the evacuation process, including e.g.: the head of the technical department, public relations (PR) specialist
3. The administrator maintains constant communication with subordinate functionaries and informs the services arriving on site of the current situation
4. The administrator decides to change the location of the assembly points after the evacuation in the event of the spread of the CBRN agent,
5. The evacuation coordinator directs the evacuation with the assistance of functional persons designated from security, administration, and other departments involved in the evacuation process
6. The evacuation coordinator collects the necessary information from the functional staff to supervise the process in the various designated sectors (e.g.: floors, car parks, administration rooms, offices)
7. The evacuation coordinator should have practical knowledge of heating, ventilation, and air-conditioning systems and how they may contribute to the spread of CBRN materials within the building structure/space
8. The evacuation coordinator collects information from tenants about the evacuation of individual shops and independents
9. In the event of multiple entrances to the building, the evacuation coordinator designates persons to secure the entrances
10. The functional staff ensures the smooth organization of the evacuation in individual areas
11. The functional staff leaving the building should report to the Coordinator about the evacuation of people from their own area of responsibility

12. At the end of an evacuation, the evacuation coordinator must determine, based on the reports submitted by the functional staff, whether all people have evacuated each room, each floor, and the entire building, and determine the number of people left (injured, unconscious, dead, etc.)
13. The designated functional staff supervises the organization at the assembly points after evacuation,
14. After evacuation, the designated person at the assembly point provides the necessary pre-medical assistance.

STAGE ONE - evacuation from premises

As indicated in the figure below in a sudden terrorist incident with CBRN agents, evacuation is carried out in a directional manner, i.e. from the site of contamination, via evacuation routes, to emergency exits, and then on to designated post-evacuation assembly points or off-site.

General advice to tenants, and administration:

1. Upon hearing the evacuation signal, stop work, make sure that all persons in adjacent rooms have heard the evacuation announcement
2. Keep calm
3. Take your mobile phone but leave other belongings behind e.g.: briefcase with laptop etc.
4. Assess the situation (decide whether you can evacuate and whether you will have time to evacuate staff and customers) - see decision-making matrix
5. If you do not have time to escape from the spreading hazard - see shelter-in-place procedure
6. If you have a disabled or injured person report the situation to the evacuation coordinator or the functional staff in charge of the area you are in and ask for help
7. If you are not in contact with security, designate a person or persons to assist with injured or disabled persons - take the initiative
8. Always evacuate in the opposite direction to the danger - indicate to clients the direction in which they should evacuate
9. If you are isolated from an exit on the ground floor of the building try to evacuate through a window (if you can do so safely)
10. Try to be the last to leave the premises,
11. Lock your doors when you leave the workplace, this will limit the spread of contamination - do not lock them
12. Do not return under any excuse, even if you see people who need help but are in the contaminated area
13. Walk, do not run to the nearest exit or staircase, if you have comfortable walking shoes, use them! you may not know how far you will be evacuated from the building
14. Inform the coordinator when the evacuation of your area of responsibility is complete

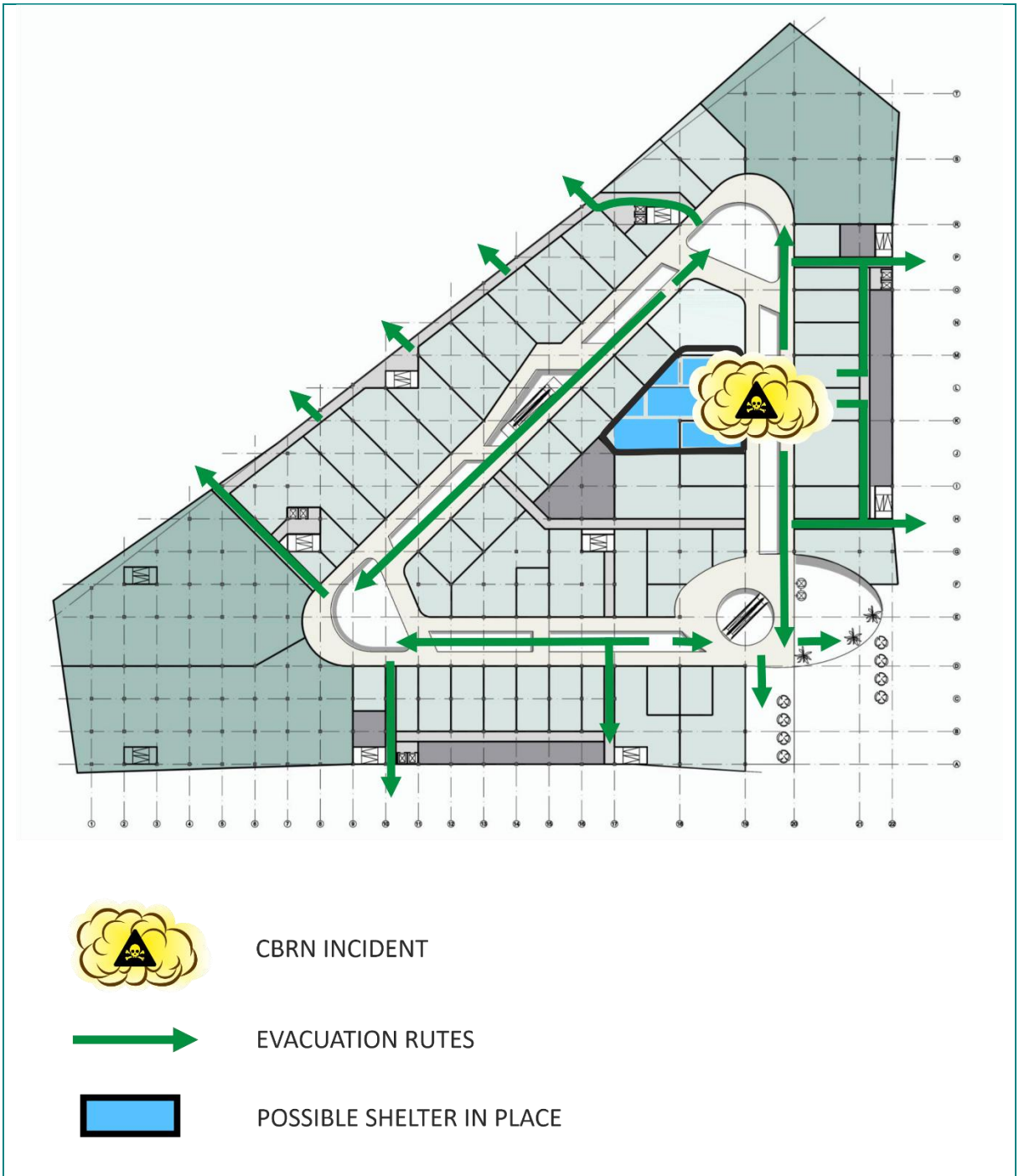


Figure 78: **Example of evacuation route in case of CBRN attack**
Source:
Own source

STAGE TWO - evacuation by emergency routes

General instructions:

1. The building at risk must be evacuated using suitably marked escape routes, these routes are generally corridors and staircases used for normal day-to-day pedestrian communication

2. Do not use passenger or freight lifts, service walkways, ducts, installation platforms, or other similar technical systems and equipment for evacuation purposes

3. When walking in corridors, on stairs, or ramps, the following rules must be respected during an evacuation:
   - remain calm and quiet
   - do not run or overtake others
   - do not push people ahead of you
   - do not stop or turn around unintentionally

FUNCTIONAL STAFF

1. Get an overview of the general situation and the situation in your area
2. If you can, use the necessary equipment in your evacuation bag - see evacuation bag
3. Direct people to the closest emergency exits, in the opposite direction to the danger
4. Prevent panic among people in your area
5. Call for calm, informing about evacuation directions
6. Take care of those who need help (not only the injured but also people with special needs)
7. Before entering the stairwells, check the stairwell by the exit door for signs of contamination, e.g.: smoke, fumes, or unconscious persons
8. Do not allow anyone to bring large items of luggage into the stairwell or make telephone calls
9. Keep contact with the evacuation coordinator during the evacuation, report any problems in your area
10. At the end of the evacuation, verify that all rooms in your area (floor, car park, corridor) have been evacuated
11. Report in detail to the evacuation coordinator about the situation

COORDINATOR

1. Once the evacuation procedure has started, transmit to all areas the decision on the assembly points after the evacuation or any other decision taken

2. Inform the services about the situation, if possible, provide safe directions or safe points for picking up the emergency services

3. Send functional staff and persons involved in the evacuation process to the indicated directions according to the evacuation plan
4. Close fire zones to reduce the spread of contamination
5. Shut down all air-conditioning and ventilation systems and other systems or objects that circulate air (e.g., fans and personal computers) and open the smoke dampers (in the event of an internal emergency)
6. Monitor the situation through available video surveillance, if unable to stay, go to a safe place outside the facility
7. Maintain constant communication with the zones and ask for situation reports
8. Keep constant communication with the emergency response team
9. Once the evacuation is complete, report the situation in the evacuated facility to the emergency response team or facility director/administrator

STAGE THREE - moving to assembly points

Criteria for the selection of the evacuation assembly area.

It is recommended that the following criteria should be used in the selection of the evacuation assembly area:

1. The area should be known and easily accessible to people who are evacuated from the building
2. This area should be downwind of the site of the CBRN agent release
3. Due to the different possible wind directions, at least two evacuation areas should be prepared in the plan and a choice made with wind direction data
4. Should be capable of housing all evacuees from the facility
5. Should be far enough away to avoid falling debris, glass fragments, collapsing structures, and the spread of a hazardous event - the distance from the building should be at least equal to the height of the building
6. The location of the assembly points should be determined in a way that does not interfere with firefighting and emergency response operations by the specialized services
7. Designate alternative evacuation assembly points in the event of a displacement hazard (contamination cloud)
8. If the evacuation assembly point is on the other side of the road, designate an authorized person to control traffic on the road to keep people crossing the road safe
9. Coordinate evacuation assembly points (especially in a crowded urban area) with neighbouring facilities to eliminate overlapping of the same emergency sites

Evacuation - Phase III

ORGANISATION OF THE EVACUATION ASSEMBLY POINT

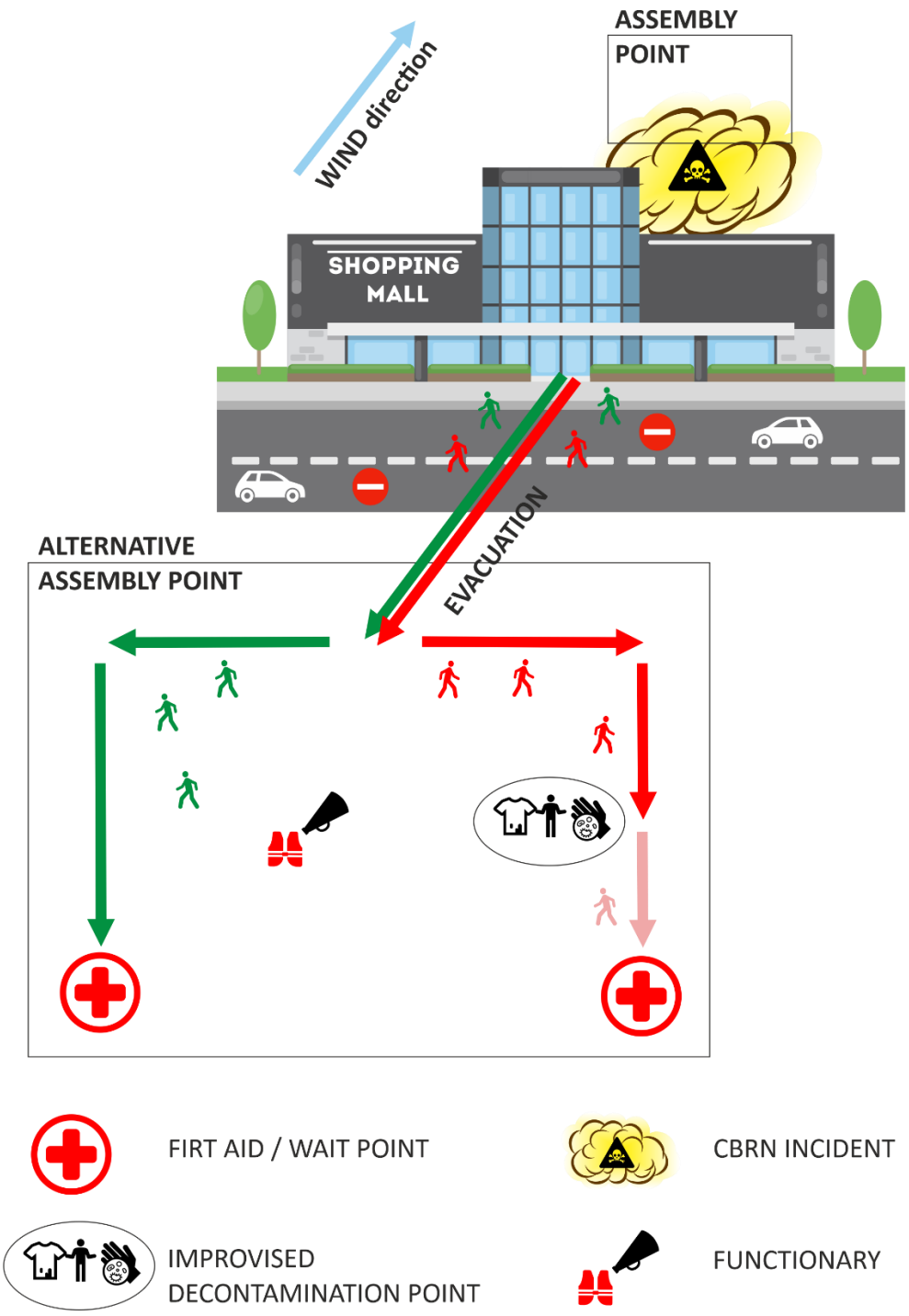


Figure 79: **Organisation of the assembly point in case of CBRN attack**
Source:
Own source

1. Assembly points should be indicated by the Director/Administrator based on pre-selected alternative and main assembly points
2. The location of the site must guarantee full safety for evacuees, regardless of the danger spreading,
3. The functionary who is responsible for organizing the evacuation assembly point should take charge of crowd control and preselect people entering the assembly area
4. In addition, persons should be designated at the point to:
    - the organization of a pre-medical aid post
    - the organization of improvised decontamination points up to the arrival of the services
    - the organization of traffic - blocking the assembly point against the entry of any vehicles
    - the organization of possible support points - equipped with water, and thermal blankets
    - reducing contamination spread (keeping removed clothes in one place, collection of used decon material – tissues, water etc.)
    - collection of valuable but possibly contaminated belongings
    - registration of people for further investigation (medical, epidemiological, crime)

10. PROCEDURES

This chapter contains procedures in the area of prevention, preparedness and response to CBRN threats.

Those procedures, after interested shopping malls revision and tailoring (if necessary), can be included theirs security manuals.

Procedures focus on two main areas:

General CBRN procedures:

1. Searching methodology
2. 1-2-3 plus procedure
3. Evacuation
4. Shelter in place
5. Initial decontamination
6. Remove, remove, remove procedure
7. Cleaning surfaces procedures
8. Tenants procedures
9. Food court

Response procedures to specific and most probable threats:

1. CBRN bomb planting information
2. Bomb threat (dirty bomb)
3. Left item
4. Parcels/letters
5. Infected persons
6. Ventilation system
7. UAV
8. Vehicle
9. Technical installations
10. External threats

General Procedures - which chronologically describes how to deal with suspected and actual CBRN threats. Starting with the principles of facility search, hazard recognition, notification, preparation and evacuation, to the initial decontamination procedure. As all shopping mall employees and tenants play an important role in the security system, they all should be familiar with these rules.

Vulnerable points protection and response procedure - describes detailed procedures for responding to specific threats related to vulnerability points identified during the study visits. These procedures apply to each group as they play an important role in the entire safety management chain.

A special attention should be put on people with disabilities or limited mobility

Providing appropriate care for people with disabilities should take place at every level of planning and maintaining the security of a facility. The administrator should give special consideration to this group of employees, tenants or customers and ensure their safety and allow for a proper evacuation. It is recommended that this group with special requirements should be taken into account when developing and implementing CBRN security procedures.

This can be ensured by:

1. Adapting the technical infrastructure of the facility to the specific needs of people with disabilities during an emergency,
7. Developing or adapting existing safety procedures to the realities of people with disabilities, taking into account the specific conditions of each shopping mall and their dysfunctions,
8. Conducting regular trial evacuations taking into account the specific conditions of evacuation during a CBRN emergency,
9. Conducting appropriate staff training in this area,
10. Providing appropriate specialised equipment to evacuate people with various types of dysfunctions,
11. Providing appropriate signage for evacuation routes and means of alerting.

Procedures below should be threaded only as recommendation, as they should be always individually adjusted to shopping malls using them.

10.1 General CBRN procedures

10.1.1 Searching methodology

The decision to search or not to search should be made by the facility manager in consultation with the security manager.
If there are any indications that information about an explosive device or a planned attack is true, it is recommended that an evacuation should be carried out in accordance with the rules in the evacuation section and the security services should be notified immediately.

Several factors should be considered when developing the decision to conduct a search operation. These are:

- the source of the background information and its reliability
- the circumstances
- the degree of terrorist threat to the state
- historical incidents

Security personnel familiar with the topography of the facility, with the means of communication, and with the knowledge necessary to conduct the search safely should be selected in the first instance.

If it is decided to use technical staff, cleaning service, tenants, or office administration to search the premises, they should be familiar with the situation and trained to carry out such activities.

Search levels in shopping malls

Figure 80: **Search levels**
Source:
Own source

The facility should be divided into zones:

1. Zone 1 - outdoor zone - car parks, access roads, pedestrian routes, litter bins, lawns, hot spots, e.g.
2. Zone 2 - internal - accessible to customers - communal spaces, toilets, tenant shops, circulation routes, lifts, escape routes, e.g.
3. Zone 3 - internal - not accessible to customers - technical spaces, offices, technical installations, back rooms, delivery zones

Rooms should be searched in teams of 2 as far away from each other as possible. Begin the reconnaissance by listening for suspicious sounds. Then carry out visual reconnaissance - avoid opening, and moving objects. Carry out reconnaissance at several levels and in a structured manner (Figure 84):

- from floor to hips
- from hips to head
- from head to ceiling
- technical spaces and suspended ceilings

Mark the rooms searched so that activities are not duplicated by other search teams or security services.

A search manager should be assigned to each area, who should coordinate activities and pass information to the person responsible for the security of the facility at any given time.

Searching individuals should:

1. Be trained in conducting search operations
2. Always consider the worst-case scenario, improve your qualifications, expand your knowledge, and exchange experiences - this guarantees your safety, professionalism, and the accuracy of your decisions
3. Be aware of the danger
4. Be aware of your safety, bravery and unprofessional behaviour can lead to accidents and hamper the action of the emergency services on the scene
5. Do not be afraid to report a threat - only a quick response will minimize the effects of any CBRN agent
6. Always update your status through available means of communication (communications, mobile phones, mobile messengers, etc.)
7. Carry out activities in accordance with your equipment and your own knowledge of the field

What should be sought:

1. Anything that should not be in a particular place (left-over objects, suitcases, backpacks, bags, barrels, containers, etc.)
2. Anything which cannot be explained by its presence
3. Anything that is not in its place

4. Anything that resembles artillery ammunition, explosives, spectacle pyrotechnics
5. Objects containing clocks (mechanical, electronic), radio devices with protruding electric wires, detonators, for example
6. Objects leaking an unknown substance, emitting smoke, making noises
7. Objects attracting attention by their external features (eye-catching, inviting to be picked up)
8. Overloaded vehicles, vehicles without number plates (with reported stolen plates, inconsistent front to back)
9. Vehicles with darkened windows, making it difficult to visually inspect the contents of the car
10. Unusual odour, incompatible with the environment, sharp, unpleasant, irritating, suffocating
11. Chemicals, chemical products, laboratory equipment
12. Vehicles and packages marked with stickers or information plates in accordance with the ADR (Carriage of Dangerous Goods) Act
13. Personal protective equipment (acid-resistant gloves, aprons, gas masks, safety goggles, protective clothing, etc.)
14. Bright stains
15. Corroded, rusted metal
16. Dead animals in the area
17. Dead or missing insects
18. Unusual dead vegetation

When any hazard is noticed, move away to a safe distance, start reporting and informing, then follow the procedures in the safety instructions. Always assume the presence of secondary threat/devices.

What not to do:

1. Do not touch, move or carry the suspect object to another location
2. Do not cut or sever any cables, cords, wires, or other connecting items
3. Do not alter natural or artificial light sources
4. Do not smoke, do not use open flames
5. Do not switch anything on or off
6. Do not taste anything

10.1.2 Procedure 1-2-3+

The 1-2-3+ procedure is a tool to assist in the process of recognition and risk assessment during incidents involving CBRN agents. This universal method is used during incidents where the victims exhibit symptoms of unknown origin and the circumstances of the incident are not clear.

If two are encountered unconscious or betraying acute ailments of unknown origin, approach with caution. With three or more victims, retreat to a safe location and immediately begin the notification and alarm process.

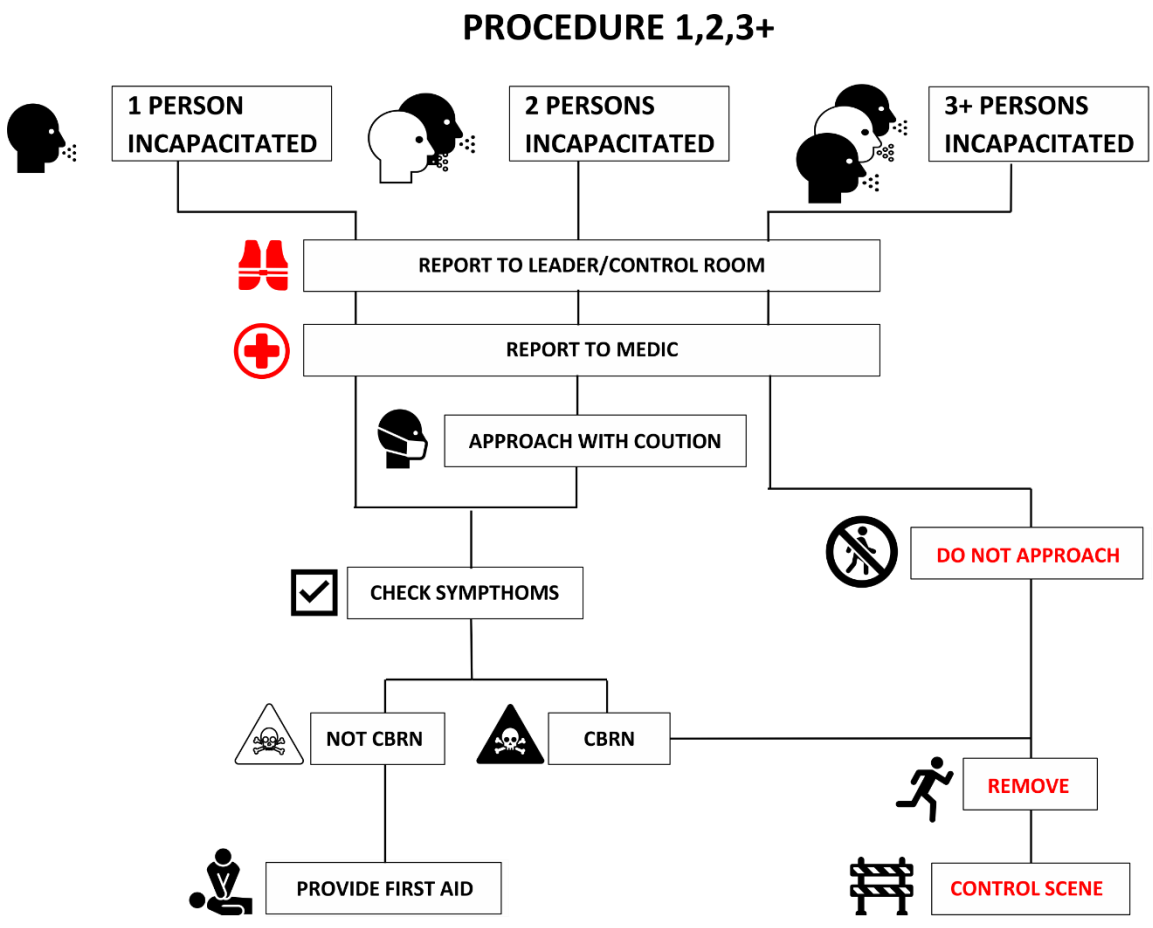


Figure 81: **Procedure 1,2,3**
Source: **?**

Follow the steps below:

1 - one individual complains of symptoms of unknown origin or is unconscious and the external environment within the incident does not indicate a potential threat, the standard mode of action is followed without additional precautions (especially if the person is conscious and there is a possibility to inquire about the causes)

2 – two persons injured or unconscious due to unknown causes, proceed with special precautions

3 – three or more persons injured or unconscious due to unknown causes, proceed with extreme caution, retreat and the remaining persons to a safe distance, inform the emergency services, facility security and management

10.1.3 METHANE

METHANE is a mnemotechnical protocol for the reporting of mass incidents by emergency services. It provides sufficient information for emergency coordination services to decide on the allocation of appropriate resources. This protocol was developed by the JESIP (Joint Emergency Services Interoperability Principles), a project supported and monitored by the British Home Secretary.

This protocol can be adapted to the shopping mall's existing notification and information procedures, in order to more effectively transfer key information to the emergency services.

This may ensure that the initial response is appropriate, reduce number of casualties and guarantee the safety of the emergency services called to the scene.

In the case of an incident not falling under a major incident, it is possible to use the ETHANE protocol.

The initial METHANE report (Appendix VI) does not have to be very detailed and is mainly aimed in alerting the required emergency services on the type and scale of the incident.

M MAJOR INCIDENT	A major incident is defined as: an event or situation with a range of serious consequences which requires special arrangements to be implemented by one or more emergency responder agency. If Major Incident not declared initially, regularly review whether the incident has escalated and may need to be declared as major incident.
E EXACT LOCATION	Be as accurate as possible, use street names, landmarks, building numbers and post codes. You may also consider using GPS coordinates, latitude and longitude or what words where these are accepted and understood by your organisation.
T TYPE OF INCIDENT	Define the exact nature of the incident, for example, road traffic collision, explosion or building collapse.
H HAZARDS	Include the hazards that are known to be present or suspected, and those that could potentially arise. Consider the likelihood of a hazard and the potential severity of any impact.
A ACCESS	Describe the routes that are safe to use and provide access to the incident. This should also include access to any relevant Rendezvous Point (RvP). In the case of a Chemical, Biological, Radiological and Nuclear (CBRN) incident, it may also include areas to avoid. Consider egress routes as some organisations will come and go from the incident such as the ambulance service transporting casualties.
N NUMBER OF CASUALTIES	Determine the number of casualties and if possible the level and severity of injuries
E EMERGENCY SERVICES	Which, and how many, emergency responder agencies are required or are already on-scene?

Figure 82: **Methane report description**
Source: JESIP METHANE

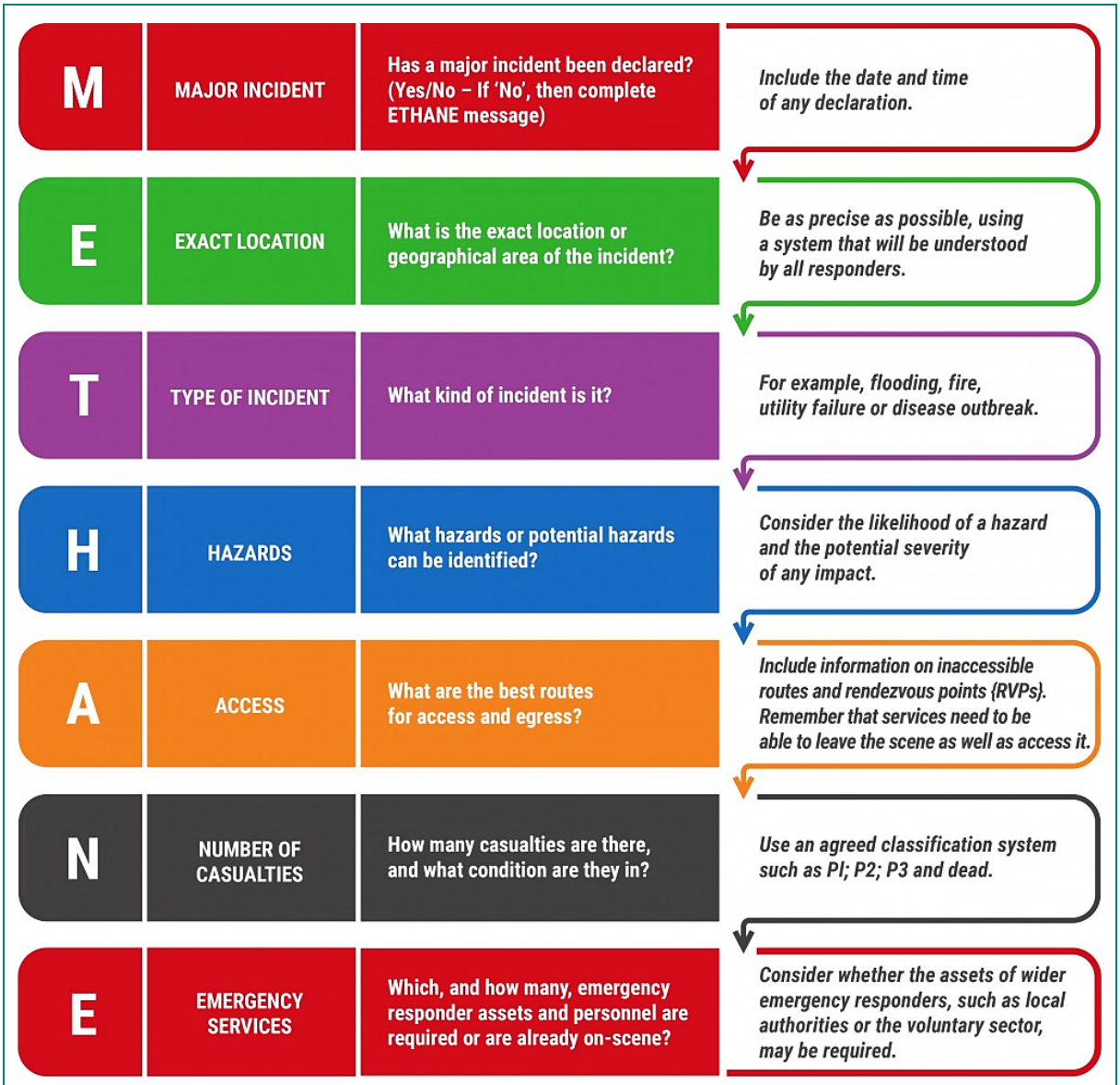


Figure 83: **Methane report**
Source:
https://www.jesip.org.uk/downloads/m-ethane-full-version/ Access:[06.06.2023]

METHANE incident scenario report example

On 19.12.2022 in the evening hours, in the Proxima shopping mall in the Masovia city, there was an attack with the use of explosives and chemicals in the form of yellow gas (suspected chlorine), detonated outside the building next to the entrance.

Before the poisonous gas was dispersed, the power supply was cut off in a nearby medium voltage station, which temporarily disrupted the work of lighting and ventilation systems.

As a result of the incident, 11 people are considered dead and another 37 injured. At that time, there were about 800 people in the facility.

Methane form is presents as an Appendix VII. Example of fulfilled Methane form is presented below.

Table 7: **M/ETHANE Form (example)**

Time: 19.10		Date:	19.12.2022
Organisation:	Proxima Shopping Mall security staff		
Name of Caller	Alan Wegrowski	Tel No.	+48 6639902882

M	Major incident	Has a Major Incident been declared? YES/NO *(If no, then complete ETHANE message)*	Security staff Alan Wegrowski Proxima Schoppin Mall, Major Incident declared
E	Exact Location	What is the exact location or geographical area of incident	Exact Location: entry point to the SM close to the junction of Mokotowska and Morska Road.
T	Type of Incident	What kind of incident is it?	Type of Incident: large explosion
H	Hazards	What hazards or potential hazards can be identified?	Hazards include: yellow poisonous gas, loose fragments of glass after the explosion, partially breached supporting structure of the wall. Wind direction north/east, straight to assemble point no.2. People are gathering in assemble points
A	Access	What are the best routes for access and egress?	Access via Mokotowska Road, egress through green belt
N	Number of casualties	How many casualties are there and what condition are they in?	Number of casualties: 11 considered heavy injured (no sign of life) next to the entrance, 37 heavy injured dreading difficulties (20 adults 17 children), 10 with minor injuries (cuts and lacerations). There are still causalities inside the building
E	Emergency Services	Which and how many emergency responder assets/personnel are required or are already on-scene?	Emergency services required: Ambulances, Fire service, HAZMAT units, Police. The police has 2 officers on the scene.

Restricted once complete

Signature

10.1.4 Shelter in place

In the case of the release of CBRN agent and the inability to evacuate the affected area (cut off exits, escape routes), try to find shelter to provide temporary shelter.

This is an emergency measure - choose it only as a last resort (used up to a maximum of 2 hours).

When choosing a shelter, try to:

1. keep calm,
2. assess your condition,
3. turn off the ventilation,
4. seal all window door openings (e.g. with tape) or place damp towels at the bottom of the door to limit air leakage under the door,
5. make sure the space you are in is safe - are you far enough away from the contamination, have you sealed/protected the room from volatile substances/gas /if you think not then look for a safer place,
6. contact security, inform them of your location and the number and condition of the people gathered,
7. analyze whether you may have come into contact with a poisonous substance, check your clothes for traces of the unknown substance (if so, see procedure for improvised deconta-mination),
8. check for skin injuries/irritations, tearing, wounds,
9. never eat, drink or smoke while taking shelter and avoid hand and face contact to minimize the possibility of accidental exposure to CBRN agents.

10.1.5 Initial decontamination

Improvised decontamination

Decontamination is the physical, chemical or disinfection process of removing a contaminant (e.g.: harmful chemicals, micro-organisms or radioactive materials) from body surfaces, objects or facilities.

Due to the complexity of the problem, decontamination should be carried out by specialised emergency teams. However, initial decontamination must be carried out to minimise the duration of human exposure to the hazardous substance, minimising the effects of the hazardous substance on the human body.

Improvised dry decontamination, unless the victims have signs or symptoms of exposure to corrosive or irritant substances (for example, redness, itching and burning of the eyes or skin), should be carried out on exposed skin surfaces.

As a first step, the hazardous substances should be removed (or absorbed) from the skin surface with any available dry absorbent material, such as paper tissue, nappies, sponges, sanitary pads, clean cloth, etc. If possible, avoid rubbing the substance into clothing and skin (this may cause the substance to penetrate deeper into the skin or clothing).

All waste resulting from decontamination should be left (if possible in bags) for later decontamination at a later stage (in one place or in dedicated places).

Pre-decontamination (dry) using gloves, sponges, and towels with cleaning or deactivating substances included in the pre-decontamination packs should be an option, especially if the contamination is a non-caustic liquid or water-reactive chemical.

Wet decontamination should be carried out if the contaminant is corrosive or is in particulate form). Depending on the nature and degree of the contamination, wet decontamination (water or soapy water, top to bottom) may be necessary. Whether wet decontamination comes after dry decontamination should be the subject of a dynamic risk assessment by emergency services personnel at the scene. However, the critical steps of rapid evacuation, clothing removal, and dry decontamination should NOT be replaced or delayed when temporary wet decontamination is established.

Improvised wet decontamination (using water) should only be used if the signs and symptoms of the affected persons are consistent with the exposure characteristics of corrosive substances such as acids or bases, or the contamination has been identified as biological or radiological. Wet decontamination can be carried out using any available water source such as taps, showers, hydrants, sprinklers, etc.

When using this method, it is important to limit decontamination time to 45-90 seconds, and preferably use a cleaning agent such as a cloth or sponge.

Improvised decontamination should not involve overly aggressive methods of removing contamination, as this could lead to the introduction of hazardous substances into deeper layers of the skin.

Additional note:

1. After the improvised decontamination has been carried out, caution should be applied and signs and symptoms should be observed on the decontaminated people and other personnel potentially exposed to hazardous substances
2. Water used for decontamination /decontamination of casualties should always be treated as contaminated, being a source of secondary contamination – collect it, do wet decontamination above any container – if possible
3. All materials (paper, tissues, etc.) used in the process should be treated as contaminated and, should not be used on other victims
4. When carrying out wet decontamination, due to the lack of outer clothing and water cooling, the possibility of hypothermia in victims should be considered
5. Contaminated persons should strictly limit hand contact with facial parts and should not eat, drink or smoke before or during the decontamination process until the arrival of the specialist services
6. Always follow the instructions of the specialist services arriving on the scene

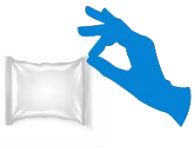
If you suspect or are sure that a potentially hazardous substance may have found itself on your clothing, if possible, follow the procedure below:

1. Evacuate yourself from the danger zone
2. Inform safety management personnel, if possible
3. Wear disposable gloves
4. Remove and unfold the plastic bag for trash
5. Climb onto the bag and remove any clothing contaminated with the hazardous substance. Do this very carefully so that you do not touch your body with the contaminated clothing
6. Put on your previously removed watch and jewellery, phone, consider whether sensitive equipment and documents (e.g. phone, hearing aids, keys, ID card, for example) can be decontaminated. If so, allow victims to keep these items after decontamination
7. Remove a pair of gloves very carefully and put them in the bag
8. Close the bag and put it into a second bag and close it
9. Wash hands very thoroughly with detergent or soap, rinse hands for 1,5 minute with water
10. Do not eat, drink or smoke
11. If you have soiled other parts of your body with a hazardous substance, try to wash them under running water, using detergent or soap, and then wash your hands very thoroughly by rinsing them with water for 1 minute
12. While doing the above, take special care not to come into physical contact with other persons
13. Regularly self-assess your own health, observe exposed parts of your body for redness, swelling, rashes, itching, check for breathing difficulties, dizziness, nausea
14. Try to remain calm and rational - many people report symptoms of poisoning after such an incident even though they have not been exposed to hazardous substances
15. Seek immediate specialist medical attention from the services on the scene

If you have an initial decontamination package follow the instructions below:

1. Open the package.

2. Put on protective gloves

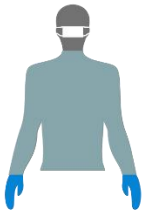


3. Open the packaging with towels.

4. Wipe the face.

5. Dispose of the wipes into a large bag.

6. Put on a protective mask.



7. Remove outer clothing (if possible, avoid pulling it over the head, if feasible, cut it off).

8. Place valuable items in an small bag.

9. Place contaminated clothing in a large bag.

10. Put on a poncho.

11. Put on socks and flip-flops.

12. Put on an identification band on the wrist.

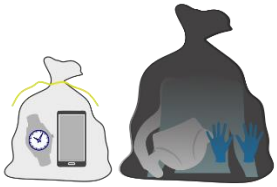
13. Close the bag with valuable items.

14. Carefully remove and dispose gloves into a large bag.

15. Thoroughly wipe hands.

16. Remove and dispose of underwear into a large bag.

17. Put on underwear.



18. Leave the bags in the place where you undressed.

Figure 84: **Graphic instruction for initial decontamination**
Source: Own source

10.1.6 Remove, remove, remove procedure

Mall staff procedure

The general scheme of action when encountering a potentially contaminated person describes a series of actions that should be taken.

Its' main feature is to protect oneself from contamination while assisting the affected person (remotely, without touching or interfering with outer clothing).

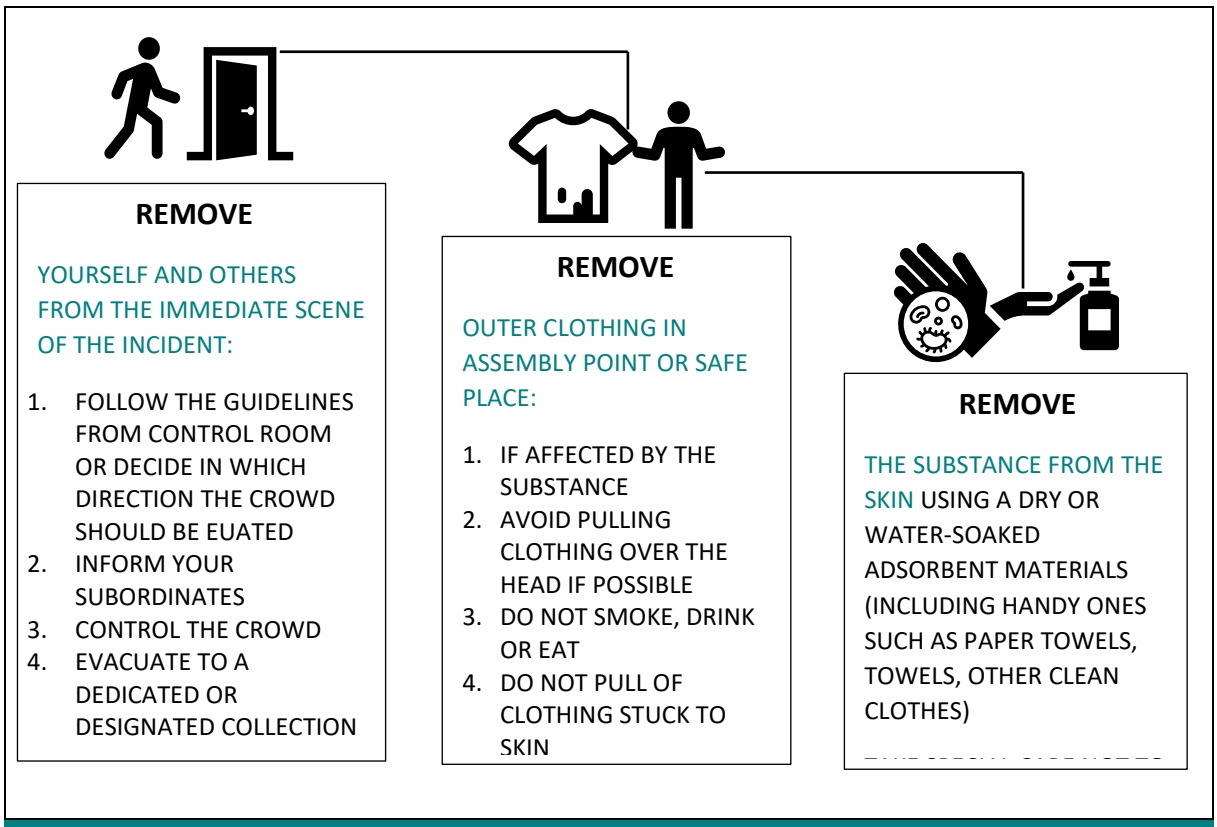


Figure 85: **Remove, Remove, Remove procedure**
Source:
https://www.protectuk.police.uk/advice-and-guidance/response/remove-remove-remove-guidance-hazardous-substance-exposure (changed)

In prescriptive form, give information (remove, remove, remove):

- Remove yourself from the area of exposure agent (liquid, gas exposure, etc.). Preferably go outside the building - be in a fresh air atmosphere. In case of skin injuries, burning, itching or pain, try to redirect the person or provide them with water or other available liquid (try to wash it off and relieve the pain). A report should already be made at this stage – METHANE

- Remove outer clothing if contaminated. Avoid pulling clothes over your head (if possible), try to keep hand contact as small as possible with clothing. Do not eat, drink or scratch. Do not remove clothing stuck to the skin
- Remove the substance from the skin is affected. Rinse continually with water if the skin is itchy or painful. If the substance in not painful or itchy, use dry, absorbent material to either soak it up or brush it off

If you do not need help, and you are safe, find out if other people do. With extreme caution, inform the relevant services, remotely give instructions in accordance with the above procedure.

10.1.7 Cleaning surfaces procedures

The coronavirus responsible for COVID-19 disease demonstrates how dangerous the spread of aggressive pathogens is in terms of biohazards. One of the ways in which dangerous pathogens are transmitted is by contact with contaminated surfaces, where they can survive in spore form for up to several months.

The shopping mall should be prepared for the arrival of a person or persons infected with viral diseases. This will require the presence of trained cleaning staff, as well as having a stock of equipment, chemicals, and personal protective equipment at their disposal.

All surfaces that meet hands, whether in the public areas of the facility, back offices or administrative areas, should be cleaned in accordance with the country's internal recommendations:

- access control handles and keypads
- staircase railings
- countertops and pedestals
- computers and electronic information boards
- electrical switches
- tables in the food court areas - after each use
- toilet flushes, taps, hand dryers, toilet paper holders, and toilet brush holders

The following guidelines can be implemented as a standard, however, to validate the procedures to be used, depending on the type of contagious disease, the health services of the country should be contacted:

CLEANING SERVICE

All cleaning staff should be informed and trained about the hazards and the procedures in place. Cleaning of areas not exposed to pathogens should be carried out in a standard manner.

The number of cleaning staff should be appropriate to the ability to clean contaminated surfaces efficiently in the shortest possible time.

The cleaning staff responsible for these activities should not include persons in contact with the supply chain, food preparation, and serving.

TRAINING

The scope of training for cleaning staff should include:

- principles for recognising and handling potentially infected persons
- safety rules in this regard
- principles of use of personal protective equipment
- the principles for the use of equipment/tools and the characteristics of the use of cleaning chemicals

Personal protective equipment (PPE):

- disposable gloves to protect against chemical and biological hazards of appropriate resistance class in accordance with safety standards
- safety goggles or safety glasses
- disposable chemical and biological hazards protective suit of appropriate resistance class complying with safety standards
- disposable protective mask or masks/semi-masks of FFP-2 class or filter elements of P-2 minimum

Recommended management of spilled body fluids:

1. Remove people from the immediate area
2. Place a "caution cleaning" warning sign,
3. Put on necessary personal protective equipment
4. Cover body fluids and organic parts with disposable paper towels to absorb excess fluids collect and place in a double bag
5. Cover remaining fluids with disinfe-ctant spray and leave for 5 min
6. Wipe the area with disposable towels and collect them in a double bag
7. Wash the surfaces with detergent and hot water using disposable tools and dry thoroughly
8. Place personal protective equipment in a double bag - secure bags with adhesive tape.

If there is a risk of secondary infection of cleaning service members, quarantine the exposed persons in accordance with the recommendations of the competent services.

10.1.8 Tenants procedures

To ensure the safety of their customers, tenants should guide them effectively during an emergency.

Tenants are responsible for the efficient and effective evacuation of customers in their respective shop spaces. Following good practices are designed for tenants to support them during an emergency situation.

Good practice:

Store space control:

1. Never leave the shop unattended or unattended by a staff member
2. Observe customer behaviour
3. Pay attention to luggage being carried in
4. Pay attention to items left in the immediate vicinity of your shop (shopping arcade)
5. Be aware of suspicious persons - remember appearance does not indicate intentions and it does not necessarily have to be the one person (look out for accomplice(s)), people dressed unusually (long-sleeved shirts or coats on warm days) wearing protective masks (outside of pandemic time), especially in crowded areas
6. Report relevant safety observations to the next shift
7. Do not obstruct escape routes and exits
8. Inform security in the store/ mall of suspicious incidents

Periodic inspection of areas accessible to customers that are not visible to cameras:

1. Check toilets, changing rooms or lockers to which public may have access
2. Check the gas and technical appliances assigned to your premises
3. Periodically check dustbins

Access control:

1. Control the system
2. Entrances and exits
3. React strongly to any attempt to breach security areas
4. In case of a change of employee, immediately cancel access to the area for the card in question
5. Change the access code periodically
6. In the event of theft or loss, replace or re-verify cards
7. Control entrances from technical /storage areas
8. Sensitize staff about information security (disclosure of sensitive shop security information)
9. Keep keys to sensitive areas in the security room

Employee training on hazards and emergency response procedures:

1. Facility training including emergency exits and evacuation plan, location of first aid kits, location of necessary firefighting equipment
2. Periodic training and drills regarding general safety and CBRN:
   - searching the rooms for any left-over dangerous items, packages, luggage
   - premedical first aid
   - how to behave if there is a possibility of contamination of the place where the employee is located
   - evacuation of customers and employees

Essential personal equipment

Equip the workplace with the necessary personal protective equipment:

- protective masks (FFP3, escape hood)
- disposable gloves
- disposable coveralls (for thermal protection if needed)

Remember it doesn't cost much, but you can gain a lot. Consider additional customer protection measures.

Technical safety measures

Invest in technical measures that make your workplace safer:

- first aid kits
- cameras
- anti-panic remote controls
- access control system
- burglar-proof doors
- applications that facilitate the exchange of information between you and the shopping centre manager
- emergency light source (torch)
- chemical light (red, green)
- Power Tape
- large waste bags

Emergency response.

Situation analysis:

1. Stay calm
2. Try to find out what the source of danger is
3. In the event of an obvious danger, make an evacuation decision yourself
4. Contact shopping centre security
5. Check that it is safe to move around the shop area
6. Do not expose yourself to immediate danger - protect yourself (use your personal protective equipment)
7. Analyse if evacuation routes are safe to move through
8. If evacuation is not possible, analyse if you have the possibility to take shelter in a temporary safe room

Evacuation

As an important group in the shopping mall's security management chain, tenants play an one of the key role in the evacuation of their own leased areas. The following are general guidelines for organizing an evacuation in such areas. However, during an evacuation they should follow the instructions of the shopping mall's evacuation managers. The detailed procedures are contained in the chapter "General procedures - Evacuation".

Evacuation guidelines:

1. Evacuate your shop/area in accordance with the emergency instructions
2. Consider alternative escape routes in case of possible danger along the main escape routes (including windows)
3. Minimise the time spent in the danger zone
4. Maximize your distance from the hazard
5. Go to the evacuation assembly point indicated by the evacuation leader (bear in mind that this point may be contaminated and too close to the danger)
6. Follow the instructions of security at the evacuation assembly point

Shelter in place

In the case of releasing CBRN agents and lack of ability to evacuate the affected area (cut off/exits, evacuation routes), try to find shelter to guarantee temporary cover.

It is an emergency measure - choose it only as a last resort (used up to a maximum of 2 hours).

When choosing a shelter, try to:

1. Keep calm
2. Assess your own health
3. Turn off the ventilation
4. Seal all window doorways (e.g. with tape) or place wet towels at the bottom of the door to reduce air leakage under the door
5. Make sure the space you are in is safe - are you far enough away from the contamination, have you sealed /protected the room against volatile substances/gas (if you think it is not then look for a safer place)
6. Contact security, and police, inform them of your location and the volume and condition of the people gathered
7. Analyze if you might have come into contact with a poisonous substance, check your clothes for traces of the unknown substance (if so, see general procedure - "Improvised decontamination")
8. Check for skin injuries/irritation, tearing, wounds
9. If you do not need help and you are safe, find out if other people need it
10. With extreme caution, inform the relevant services about situation
11. Remotely give instructions according to the procedure - "remove, remove, remove"
12. Never eat, drink or smoke while sheltering and avoid hand or face contact to minimize the possibility of unintentional poisoning by CBRN agents

For more details go to “shelter in place” in general procedures.

Post evacuation

1. Keep calm
2. If you feel any effects of the contamination seek medical attention
3. If you may have been contaminated do not hide it from the emergency services - this will allow the services to take appropriate action which may save your life
4. Follow the instructions of the security or emergency services arriving on the scene

10.1.9 Food court

Shopping malls are moving away from the traditional operating model, focusing only on retail and sales. Consumer expectations of such facilities have increased significantly. For several years now, food courts, i.e., sections of shopping malls with a catering offer, have been playing an increasingly important role.

Figure 86: **Self-service buffet**
Source:
© Pixel-Shot_via_AdobeStock_440621183

The shopping mall is supposed to be not only a place for shopping but a space where it is possible to spend a pleasant time and at the same time take up the offer of other services. The high popularity of cafés and restaurants is leading to increased business volumes. Data from the Retail Institute shows that in Q2 2019, the results of large shopping centres and chains increased by as much as 16.2% year-on-year. The food and beverage zones are a significant contributor to this.

A varied culinary offer is able to attract customers just as effectively as, for example, a new shop. An extremely important concept that has become a permanent feature of food safety management systems is Food Defense.

It stands for the protection of food products from intentional contamination by physical, chemical, biological, or radiological agents. The term was born in the United States after the attacks on the World Trade Centre in September 2001. Food Fraud and Food Defense, in addition to negatively impacting on company perception and diminishing company value, are also associated with significant withdrawal and disposal costs.

In the case of shopping centres, the concentration of several food service providers in one place can result in a loss of profits not only for the providers themselves (not only for one food chain in particular SM but in all across the country) but also affect the overall image of the entire facility (SM, so all tenants are affected).

It is therefore necessary to take measures to reduce their risk.

Companies should create food protection plans and policies, as well as procedures, to reduce potential consequences and protect the reputation and brand of the producer.

Food protection plans should include, among other things, the segregation of staff responsibilities, the identification of vulnerabilities, and the establishment of appropriate control measures.

Great emphasis should also be placed on staff training and awareness building.

Food Defence threats can be divided into internal and external threats:

- Internal threats - these can be current employees (including temporary ones). This is the most important category of potential perpetrators due to their possible high level of access to the production area and products. This access can cause direct contamination of the product or raw materials.
- External threats - these could be contractors such as caterers, and supply chain personnel who may also have legitimate access to raw materials as well as the final product.

Food terror is most often dictated by an act of revenge against, competing producers, suppliers, or employers, it can also be part of the sabotage of food products or simply the result of a mental disorder. Cases of deliberate food contamination occur all over the world and are not necessarily perpetrated by CBRN means. The most used food terror agents are rat poison, cyanide, arsenic, mercury, pesticides, and household chemicals.

In Europe, only the British and the Ukrainians had a few cases of CBRN agents being used to deliberately contaminate food. These have been rather cases of food terror and assassination attempts at the same time, but in which CBRN agents were used. Examples are the cases of Alexander Litvinenko (former KGB agent Litvinenko drank tea with radioactive polonium-210) and Victor Yushchenko (the Ukrainian president ate the soup with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD).

In 1972, members of the terrorist group RISE were arrested in Chicago with 30 kg of cultures of typhoid fever bacteria (Salmonella typhimurium) (a biological agent) to poison the Chicago region's water supply, but new members of the group informed law enforcement.

In 1989, fruit imported from Chile was contaminated with cyanide. The US government received information about the act of food terrorism from the US embassy in Chile. Traces of cyanide were found in two samples of Chilean grapes in the Philadelphia area. The economic damage in Chile amounted to $300 million. The US had to destroy 45 million different fruits from Chile (nectarines, apples, berries, grapes) and lost $50 million. This event destabilized the country's economy and cyanide was included in the list of CBRN agents.

In 2002 in China, in the city of Tangshan near Nanjing, Chen Zhengping placed the poison tetramine in the water system of a rival restaurant, hoping to cause digestive distress for guests at breakfast. In doing so, he used banned rat poison. Thirty-eight to 100 people died (Figures vary according to the newspaper) and 300 people were hospitalized. This was not food terrorism with a CBRN agent but an example of other dangerous substances being used for this purpose.

In 2003, in the town of Ruyang County in central China's Henan Province, Cao Qianjin dumped pesticides into a water tank. Cao bought 20 bottles of a pesticide called '3911' and dumped 500 mL into the water tank. He confessed to this act and explained that he hoped to use the poisoned water to sell the water purifiers he distributed.

Sixty-four residents were poisoned, 42 of whom were taken to hospital. More detailed information relating to risks in the food court area can be found in the report "Best practices for prevention of food CBRN incidents" - Deliverable D5.4.

Risk response:

1. Develop a food safety plan that includes segregation of staff responsibilities, identification of vulnerabilities, and establishment of appropriate control measures
2. Training of personnel on the safety of food products on an annual basis or when there are significant changes in procedures,
3. Formulation of safety-critical positions and systematic evaluation of the tasks assigned to them as part of their job responsibilities
4. Definition of specific rules for key locations to which only trusted staff can have access
5. Defined areas particularly vulnerable to attack should be accessed only by designated persons
6. Access for supply vehicles should be covered by monitoring points and authorized by recipients,
7. Develop rules for the protection of utilities (mains, gas supply, drinking water, drainage system, telecommunications systems, cold stores, purification systems) to deter sabotage attempts and deliberate contamination
8. Developing a system and rules for monitoring and reporting the presence of bystanders at key sites - responding immediately to such situations and activating the notification chain
9. Developing rules for supplier verification

10.2 Vulnerable points response procedures

10.2.1 CBRN bomb planting information

General description

One of the most common disruptions to the day-to-day operation of a shopping mall is information with threatening information about a possible terrorist attack.

These are mainly information provided via:

- e-mail
- text massage
- telephone
- sent by mail

Motives are most often:

- criminal activities desired to paralyse the SM activity
- financial extortion
- prank calls
- criminal and terrorist activities checking existing response procedures
- other criminal and terrorist activities

The vast majority of these are false alarms often leading to the evacuation of the shopping mall.

Response to the threat

The person receiving a call/information that a dangerous device has been planted or that an attack is about to take place (whether it is a security guard, tenant, or shopping mall office staff) has a responsibility to:

1. Take the information seriously and as a priority
2. Obtain as much information as possible from the caller/sender to obtain as much information as possible about the location, size, time of detonation, CBRN agent used, effects it may have
3. Take notes of the words or text using literally the same wording as the caller/sender
4. Pay attention to the caller's background sounds and voice to be able to recognize the location from which the call is coming and the caller themselves
5. Immediately inform those responsible for making key security decisions in accordance with the security grid specified in the security manuals for the site concerned
6. Inform the relevant law enforcement services according to the security grid of the country concerned

If the information is obtained by the phone, use Threatening Information Form (Appendix IX).

Person in charge of security

When receiving a report of an explosive device, immediately follow the recommended course of action.

General scheme of action:

1. Stay calm, the vast majority of calls are false
2. Inform the management of the shopping mall
3. Immediately inform the nearest police station on duty or the relevant CBRN emergency service via the emergency number
4. Inform the shopping mall's line security staff
5. Inform the tenants of the situation (by app, telephone, or other means of communication)
6. Decide whether to search, not to search, or to evacuate the shopping centre, according to the threat level, in accordance with the "search methodology" and considering the national terrorist threat of the country concerned
7. Instruct CCTV staff to scan the areas under CCTV surveillance to identify a suspicious object/person
8. A search of the immediate vicinity of the emergency command post location (security guard room /directorate office)
9. Move the command post to a backup location if a threat is detected, keep a record of all relevant activities in the case of a non-evacuation decision, conduct a briefing with subordinate staff, provide information on what staff should be aware of when performing their tasks, a debriefing should be carried out each time additional relevant information becomes available which affects the process of recognition, neutralization of the hazard or which affects the safety of all workers
10. If you have ordered a search, supervise it in terms of:
    - the presence of suspicious objects or changes in the environment
    - checking shopping arcades, evacuation corridors, evacuation assembly points, catering areas, toilets, the roof, the delivery area, technical areas
    - draw the staff's attention to any unusual behaviour of persons in the centre and its immediate surroundings

10.2.2 Bomb threat (dirty bomb)

General description

The ability to obtain the components and the knowledge required to construct a nuclear weapon makes the use of such a means of mass destruction one of the least likely scenarios. Nevertheless, gathering radioactive materials and using them to create an explosive charge is not impossible. Knowledge of security and how to use radioactive material to construct a so-called 'dirty bomb' still poses a great challenge to terrorist organizations.

A dirty bomb is nothing more than a combination of conventional explosives with radioactive materials.

Among other things, the explosive in this arrangement provides a means of dispersing a dangerous agent. From the point of view of the possible dangers, the radioactive material itself does not pose an immediate threat to life; the detonation of the explosives and its accompanying effects are much more harmful. The more widely radioactive material is dispersed by the explosion, the less of a threat it poses but recovery after the bigger dispersion could be more challenging.

The use of this type of agent is mainly a mass media impact and leads to the creation of intimidation and panic, local contamination, or the massive costs associated with decontamination and the temporary shutdown of the facility.

Only materials with a high level of radioactivity can cause immediate symptoms that may indicate the use of this source of danger. These include:

- a local burn with no known cause,
- abnormal blood counts, nausea, and vomiting in a group of people, which can occur after several hours to several days.

Similar effects are accompanied by hidden sources of radiation. These are radioactive materials placed in the locations of potential victims (random or targeted at specific individuals). Such materials can simulate and take the form of any object.

The only effective method of detecting the use of such agents is through radiation detectors.

Response to the threat

In the case of an incident or when radiation is detected by a dedicated device, follow the procedure:

1. Retreat to a safe distance
2. Protect your respiratory tract from the possibility of dust entering your lungs
3. Remove outer clothing. Avoid pulling clothing over the head (if possible), try to keep hand contact with clothing as small as possible if possible, and wash your whole body with water to rinse off dust residues after the explosion
4. Do not remove clothing stuck to the skin
5. Move away from the area of influence of the hazardous substance (liquid, gas effects, etc.). In the event of skin injuries, burning, itching, or pain, try to divert the person or provide them with water (try to wash it off and relieve the pain)
6. Do not eat, drink, smoke or scratch
7. Remove substances from the skin using dry or water-soaked absorbent materials (including handy ones such as paper towels, towels, and other clean clothes, e.g.). Take special care not to rub the substance into the skin
8. Try to keep all contaminated clothes in one place. Collect all decon solutions in a container and give it to dedicated services only. Decon solutions still could contain radioactive material and be a source of secondary contamination
9. Provide emergency medical services /accident coordinator with your name, address for further analysis
10. Check with radiation detector effectiveness of radioactive material removal or decontamination by specialised service
11. Monitor yourself if you experience dangerous symptoms immediately call emergency medical services and wait for help

10.2.3 Left item

General description

The categorization of left luggage/objects as potentially dangerous (suspicious) is based on an analysis of three elements: the location of the object, the time, and the circumstances of detection.

- Location - not all items left unattended are likely to be suspected. Everything that is hidden, obviously suspicious, and unusual should be considered suspicious. Usually, items left in visible places such as benches, restaurants, toilets, or vending machines are simply forgotten or discarded, however, they also should not be neglected.
- Time - peak hours, highest traffic intensity indicate intentional leaving of an item more than in the morning hours or just before closing of the mall.
- Circumstances - the domestic situation in the country, a state of heightened alert announced in the media, information coming from your own or other business networks about the possibility of an attack, the intensity of attacks in recent times, important events in the city (match, concert) may indicate an increased risk of attack.

The most important factor affecting security is to spot/locate left luggage/objects as quickly as possible. Awareness training of shopping centre staff and tenants is extremely important throughout the entire process.

If at any stage, you identify characteristics of a suspicious item - follow the other security procedures.

Response to the threat

Rely on 4C's rule:

1. Confirm
2. Cordon
3. Call
4. Control

Confirm – hazard identification

1. Go to the area of the object spotted as soon as possible
2. Ask people in the immediate vicinity if it is their item/baggage or if they have any information as to who it belongs to
3. At the same time, communicate with the monitoring crew to identify the owner of the object and his/her appearance and behaviour
4. Characteristics indicative of a dangerous item include:
    - protruding electrical wires
    - power sources or electronic components connected to other equipment
    - clocks and other time devices combined with any other object
    - antennas, mobile phones, radios combined with other items

- objects of military origin (weapons, cartridges, bullets, grenades, explosives, etc.)
- emitted sounds (ticking, hissing, etc.)
- fumes, strange smells, smoke
- strange, nervous behaviour of the object's owner resulting from the observation of the monitoring and witnesses (nervous movements, quickly moving away from the place, leaving the object immediately, etc.)

Cordon

1. Do not allow bystanders to enter the area of the object left behind
2. Try to identify the potential danger based on the external characteristics
3. If, based on the analysis of the information received from the monitoring and the external characteristics of the object, it appears to be a dangerous object, follow the procedure below:

Call

1. Inform your superiors at each stage of the procedure
2. Inform the necessary personnel of the shopping centre about the situation
3. If a threat is identified, follow the crisis management chain of the security manual

Control

1. Control at every stage of all safety-related activities and the adequacy of the procedures carried out

10.2.4 Parcels/letters

General description

All parcels delivered to the shopping centre should be hand-delivered or delivered via the parcel reception/distribution point at a designated point in the centre.

Deliveries should be avoided by being left unattended in front of shops before they open. All deliveries should be advised and inspected. In the case of a heightened terrorist threat, any parcel left unattended should be treated as a suspicious item.

Response to the threat

The following procedures for handling correspondence and parcels are practical guidelines for all shopping centre staff and can/should be passed on to tenants for voluntary implementation in their own procedures.

Incoming correspondence and packages:

All correspondence and parcels (including commercial and personal), should be checked to verify the addressee and sender.

Mail and parcels considered to be suspicious:

Any consignment or package should be considered suspicious and requires special handling if:

1. A fictitious or unknown sender has been identified
2. Indicates signs of leakage of a suspicious substance (liquid)
3. An unknown powder or granular substance is spilled
4. Contains unusual wording (including threats)
5. Comes from an unusual and unexpected source or location of the sender
6. Parcels with protruding wires, emitting an unusual odour
7. Packages emitting a sound
8. Packages containing unusual perceptible objects
9. Packages of unusual weight
10. Recipient's name is missing - only the position
11. No return address
12. Excessive number of stamps
13. Linguistic errors
14. Inscription like: "To be sent by hand", “Personal!”

If one of the above points has occurred, put the consignment down, notify management, and shift leader/monitoring.

If you are suspicious about a package, it is advisable not to open it.

When you have not opened a package/parcel and it seems suspicious to you:

1. Handle it with care
2. Don't shake or bump it
3. Do not open, smell, touch or taste it
4. Call to security

This section applies if the parcel has been opened and the person opening it had or may have had direct contact with a potentially dangerous substance.

When you have opened a parcel containing an unknown substance (powder, granules, 'oily' substance, liquid):

1. Put the parcel down
2. Inform the nearest personnel of the situation - at a safe distance (activating chain of alert)
3. Secure (cover) it, e.g. With a plastic rubbish bag and adhesive tape or other appropriate measures
4. Turn off ventilation and air conditioning, close windows if they are open (to eliminate movement and air exchange)
5. Ensure that no one else approaches the location of the dangerous consignment
6. Walk to the nearest room with running water
7. Remove jewellery, and watch from your hands, put away your phone if you used it after opening the consignment
8. Wash your hands very thoroughly using detergent or soap and rinse your hands with water for about 1.5 minutes
9. Stay in the room until the appropriate emergency services arrive

If you are sure or just suspect that a potentially hazardous substance may have been found on your clothing, then:

1. Put on disposable gloves
2. Take out and unfold the plastic bag for rubbish
3. Step onto the bag and remove any clothing contaminated with the hazardous substance
4. Do this very carefully so that you do not touch your body with the contaminated clothing
5. Put your previously removed watch and jewellery in it, your phone if you used it after opening the hazardous parcel
6. Close the bag and put it in another bag and close it
7. Remove gloves very carefully so that the outside of the gloves do not touch your body
8. Throw the gloves into a waste bin
9. Wash hands very thoroughly with detergent or soap, and rinse hands for 1.5 minutes with water
10. Move to another "clean" room. Close the door behind you
11. Do not eat, drink, or smoke
12. Make a list of people who have had contact with the parcel
13. Observe exposed parts of your body for redness, swelling, rashes, and itching. Observe for breathing problems, dizziness, and nausea
14. Try to stay calm and rational

10.2.5 Infected persons

General description

A biological attack is the use of pathogens or toxins against humans, animals or vegetation.

We can identify two types of biological agents:

1. spreading from person to person (e.g. Ebola, COVID-19),
2. having effects but not being transmitted from person to person (e.g. anthrax, botulism)

Due to the long incubation time and the first signs of infection or poisoning, detection of this source of threat is difficult.

Terrorist groups planned to use infected individuals (with the Ebola virus) to carry out a biological attack in Europe.

Response to the threat - (procedures/good practice)

Shopping mall employees, tenants, and security staff should be alert to people who show strong and visible symptoms of infection or biological poisoning.

If you notice a person vomiting, defecating, bleeding from natural body orifices (nose, ears, eyes), pale, or lacking logical contact, treat the incident with due caution. You should assume, and suspect that such a person is poisoned or infected.

Remember that your own health is the most important thing and make sure you have personal protective equipment (gloves, mask, goggles) before you intervene or render assistance to such a person.

In case of contact with probably infected person follow steps listed below:

1. Report the situation to the security manager. Call emergency medical services
2. Equip yourself with gloves, a mask, and safety goggles
3. Look all around for objects or substances that may cause such effects
4. Observe if there is a strange odour or smoke in the air
5. Isolate the area and inform the nearest tenants of the situation
6. Ask the affected person (if conscious) what is wrong and if they know what the cause may be
7. If the person can move on their own, take them to isolation or the first aid room

If you know that you have come into contact with, or taken part in the first aid treatment of, a person suspected of being infected with a disease pathogen then:

1. Inform your employer and co-workers
2. Keep contact with other people to a minimum, taking all safety precautions (remote talking, protective mask, gloves, etc.)
3. Report to your doctor
4. Follow your doctor's instructions
5. Take care of your personal hygiene
6. Keep in touch with your employer and the medical facility where the person you had contact with is being treated
7. Always observe your own health

10.2.6 Ventilation system

General description

The mechanical ventilation system ensures that, regardless of weather conditions, fresh air is constantly supplied to the rooms, and used air is removed. Depending on the size of the building, it can function as a single system or a network of independent units.

The system is potentially exposed to hazards caused by the spraying of chemical or biological substances or suspensions emitting ionizing radiation. Adequate protection of access to the technical space guarantees that equipment and the transmission network are always kept out of the immediate risk of contamination.

The most exposed components would include air intakes, air handling units and transfer ducts. In many existing buildings air intakes are located below or at ground level. It is beneficial to locate air intakes at the highest practical level of the building.

In order to protect against malicious activities, air intakes should be shielded by screens to prevent materials and other hazardous and dangerous substances from being placed, thrown or sprayed into them by a drone. Such screens should be sloped so that thrown objects can roll or slide off the screen, away from the intake. Shopping malls typically have multiple ventilation zones, each operated by its own air handling unit and duct system. In practice, these zones are not completely separated if they are on the same floor. Air flows between the zones through corridors, vestibules, and doors, which are usually left open.

Isolating separate ventilation zones minimize the potential spread of airborne hazards within the building and reduces the number of people potentially exposed in the event of a CBRN agent release. Unfortunately, the openness of shopping mall spaces prevents the effective isolation of zones. Nevertheless, this type of protection is possible, for example in administrative and office areas.

Response to the threat

Considering the above, attention should be paid to:

1. securing air intake locations to prevent unauthorized access:
   - physical surveillance,
   - CCTV surveillance,
   - motion detectors,
   - access control system,
   - unauthorised entry detectors,
2. securing air intakes against the possibility of intentionally injecting toxic substances,
3. installation of dangerous gas detectors.

10.2.7 UAV

General description

Technological developments have made flying drones (unmanned aerial vehicle – UAV) more common in everyday use. Until recently, they were used for entertainment, while over time they began to find application in various areas of life or industry, as well as for military or terrorist purposes, where they serve as platforms for reconnaissance, the carrying of warheads, or improvised explosive devices.

With the use of this device, it is possible to reach places that are difficult to access and are protected from unauthorized access, so it is necessary to anticipate the possibility of defending against such an attack in order to minimize its effects. Ease of operation, access, and low cost make them the perfect platform for dispersing CBRN agents in terrorist attacks. Specialized agricultural equipment seems ideal for this type of application.

They can disperse up to several tens of litters of agents in a short period of time.

Transport by air bypasses any security of opened shopping malls and counter-measures are costly, difficult to apply and relatively easy to avoid. Since air intakes are located on rooftops in most facilities and these are well protected from third-party access, the use of a drone may be the only way to deliver a CBRN agent to these facilities. The use of this dispersal means is also additionally desired by terrorists due to the anonymity, safety of the perpetrator himself and the minimal number of people required to carry out the attack. The attacker is able to carry out an effective attack alone from a safe distance and his location is extremely difficult to detect and difficult to protect against.

Response to the threat

It is recommended that the shopping mall security should be provided with a procedure related to UAV incidents. That actions should be as simple as possible:

1. Creating a no-fly zone for UAV flights in SM premises
2. Securing sensitive installations (like air intakes) against the possibility of intentionally dispersion on dangerous agents (etc., by installing protective nets)
3. If a UAV is observed outside the SM but within its boundaries, e.g., above the roof, or inside the building, it is recommended to:
   - observe the movements of the UAV
   - observe whether the UAV is carrying an attached payload
   - whether gas, powder or liquids is dispersed
   - pay special attention whether UAV is approaching the air intake

4. If the UAV is inside a building, warn bystanders of the danger (due to technical conditions, it may lost radio connection and crash in a random place
5. Notify the police
6. Try to find the UAV operator (physically and by CCTV)
7. If the person is found, and the area is no-fly zone, ask them to stay until the police arrival

10.2.8 Vehicle

General description

Vehicle-related hazards range from accidents to use in terrorist attacks. The vehicle, due to its ability to transport significant quantities of dangerous agents, is considered to be one of the most likely sources of delivery of hazardous substances into a shopping centre. Due to its mass and momentum, it can additionally serve as a tool to make a passageway at access points that are not protected against this type of attack and to ram people, thus increasing the number of victims of an attack.

Factors that increase the possibility and effectiveness of such an attack are:

- freedom of movement within the shopping mall on designated internal roads
- the proximity of car parks to the facade of the facility
- location of assembly points after evacuation in the car parks
- underground car parks - a trap for vehicle evacuees
- weak anti-terrorist security at entry points before vehicles enter the area,
- anonymity - theft or rental of a vehicle,
- additional possibility of ramming people increasing the effectiveness of the attack
- possibility of destroying technical installations e.g. gas pipes, electrical stations

Response to the threat

Threats from vehicles can be mainly mitigated by installing technical/anti-terrorist security measures that can passively or actively protect key elements of the Shopping Mall against this type of attack. These measures can be installed either permanently or temporarily in the case of an increased risk of a terrorist attack.

If a situation occurs where a door or other access point to the mall is rammed and a vehicle enters the mall, it should be considered that it could be a common accident, as well as a terrorist attack using CBRN means. This type of incident should always be approached with great caution.

In the first place, particular attention should be paid to:

1. Type and circumstances of the incident
2. The symptoms of the injured person
3. Your own state of mind (you feel dizzy, nauseous)
4. Gases coming from the vehicle, odours
5. Other items that may indicate an attack with CBRN agents (canisters, containers, barrels)

If the incident has the appearance of a terrorist attack using CBRN agents then follow the general security procedures and initiate the notification and information process in accordance with the safety grid.

The facility security manager, once the above information is received, should immediately decide to evacuate the facility and inform the emergency services about the situation.

If possible:

1. Move to a safe place (downwind, out of the affected area)
2. Immediately notify the monitoring crew, shift commander, or head of security
3. Secure the area against access by customers of the mall

10.2.9 Technical installations

There are a number of technical installations such as gas, electricity, fuel, and other installations within the shopping centre. These installations can be used directly or indirectly to carry out a terrorist attack using CBRN means. An important element is the need to locate the sensitive points of these installations vulnerable to terrorist attacks and to secure them accordingly.

The main efforts should focus on the technical security of the area against unauthorized access. This should be preceded by a security audit carried out by specialized companies, paying particular attention to gas and oil installations to identify unauthorized access and potential vulnerabilities. Appropriate measures should then be designed and implemented to protect these installations from damage or from being used in an attack.

GAS INSTALLATIONS

General description

The popularity of gas installations has a not-inconsiderable impact on the safety of buildings. Natural gas is a mixture of gases and various chemical compounds (e.g. odorous).

However, regardless of its physical and chemical properties, when mixed with air the gas forms an explosive mixture. Just how dangerous this is, is confirmed by the many accidents and building disasters caused by gas leakage. The use of the existing gas installation in Shopping Centres has an impact on the operation of the building itself and many other business activities.

Natural gas installations are vulnerable to intentional damage or terrorist attacks using explosives, or other factors that could create an explosion or fire.

An important consideration is the safe design of the installations within the facility itself, to avoid the placement of pipes in the immediate vicinity of hazardous material storage. Malicious actions can cause not only a space explosion of gas but also lead to the dispersion of hazardous chemicals such as: chlorine or ammonia. Another type of threat is cyber-attacks, which, as a result of receiving remote access to the control system, can take control of the proper operation of the installation and thus reduce the security of the facility. Cyber threats can arise both from the actions of terrorist hackers and as a result of sabotage carried out by employees with access to control systems. This threat requires particular attention to be paid to the verification of key personnel with access to the access protocols of ICT (information and communication technologies) systems for the management of sensitive technical installations.

Response to the threat

The minimum list of appropriate safety control measures for natural gas installations includes:

1. documenting security procedures and maintenance activities,
2. installing physical and logical access controls to cyber assets,
3. authentication of authorized users,
4. secure design of technical infrastructure networks,
5. constant supervision of the maintenance of the installation by verified operators,
6. use of pressure gauges and sensors to identify gas concentrations.

WATER INSTALLATIONS

General description

Water infrastructure, along with the technology required for its daily operation, is considered one of the critical elements of technical infrastructure. The target of attacks on water infrastructure can be direct damage to water purification or delivery systems. In this way, it can be contaminated by injecting poisons, pathogenic organisms, or chemicals into the distribution systems.

Water installations include:

- distribution of drinking water
- purification,
- storage,
- sanitary systems,
- heating systems,
- fire-fighting systems

Access to points in the system where chemical or biological agents can be introduced in shopping centres, in sufficient quantities to cause large-scale health risks, is usually limited. In addition, where water purification is employed, the range of chemical compounds is under strict control. Where biological agents that are resistant to treatment processes are used, there is the potential for poisoning the water.

Treated water is usually distributed to end users via distribution systems under high pressure and often inside technical zones. Although the main function of pipelines is to transport water, the pressurized nature of the network can prevent the possibility of injecting unwanted substances.

Tanks and pressure towers

In some shopping malls, the supply is not directly from the distribution network but from local reservoirs and pressure towers above the level of the consumers. The final distribution to users via an independent pipeline network is often supplied by gravity at a lower and more stable pressure. The purified water in these reservoirs and towers is not under pressure and can therefore be more vulnerable. Tanks in shopping malls are also used as an integral part of sprinkler and hydrant systems, which can be used to supply deconta-mination lines.

Response to the threat

1. installations and their critical components should be installed in secure technical spaces, out of the access of unauthorized persons,
2. critical points of the installation should be supervised by technical and physical surveillance systems,
3. technical staff should be verified, in terms of safety, qualification, and experience,
4. adequate procedural supervision should be in place for the maintenance and servicing of the installations (all maintenance work carried out by an external entity should be announced and supervised),
5. staff and tenants of the shopping centre should be alert to unusual activities in the area of these installations and report them,
6. separation of the different parts of the water distribution system improves control and allows the rapid isolation of suspicious or contaminated parts of the system.

10.2.10 External threats

Dangerous goods are substances and chemical compounds used in many industries, mainly in production processes. Major industrial accidents or catastrophes of vehicles transporting these goods, due to the significant quantities of dangerous substances that may be released into the environment, present a potentially high risk to facilities located in the vicinity of such plants, installations, or transit routes. They may be the result of disasters during transport, malfunction of technical installations of industrial plants, vehicles transporting them, fire, or explosion. An accident may occur as a result of a technical failure, but also intentionally through sabotage or a terrorist attack.

The zone of influence of some measures, depending on weather conditions and the type of incident, can reach up to several kilometres. Therefore, such risks must be taken into account in the security plans and instructions.

The most important factors determining the radius of the impact of a hazardous cloud are wind strength and direction, temperature, and dispersion method.

A key element in improving safety is the development of an appropriate response plan. Those responsible for organizing safety should liaise with the institutions responsible for managing the transport of hazardous materials in the area and establish cooperation with industrial plants. Only close cooperation will allow the development of an appropriate and effective plan.

When analysing and responding to these risks, the following should be taken into account:

1. Type of industry and possible risks associated with it
2. Type of transport mode in the vicinity of the site (road, rail, inland waterway, air)
3. Distance and direction from these points
4. Identification of the type of dangerous goods present or being transported
5. Determine the appropriate action to take after the incident has occurred
6. Establish a point of contact for exchanging information on the risk with nearby facilities and relevant services
7. Carry out systematic training related to the implemented procedures to counter the risks

11. SUMMARY

Information presented in this handbook are intended to be used during trainings and also for preparation of instructions, manuals, procedures or other documents relevant for increasing awareness and preparedness against chemical, biological, radiological and nuclear threats.

Due to large amount of knowledge to be transferred material are divided into 11 chapters. For those who want extend knowledge in CBRN field additional information are provided in attachments as well as examples of forms.

Chapter 1 – Introduction – introduces readers to CBRN field and describes aim of the handbook.

In chapter 2 – Handbook goals and target audience – main goal of the Handbook are presented – which are:

- to increase awareness level of possible CBRN attacks or incidents
- to provide information about CBRN threats and ways of detection and protection against them
- to present recommendations of important prevention and response procedures

Moreover target groups for the training are described. This description is needed as the groups are characterised by functions not positions within company structure. The chapter 2 helps decide who should participate in training and which.

Chapter 3 – Threats – provides information about possible threats coming from CBRN agents. They could intentional (crime or terrorist attack) or unintentional (failure in nearby storage facility or road incident with a truck transporting toxic chemical).

Different ways of contamination are presented, like direct (like inhalation of toxic substance) or indirect (CBRN agent transfer from person to person from contaminated item to person).

In this part examples of CBRN attack and incidents are also presented to show that the threat is real and consequences are really serious. It could also raise awareness level among SM staff.

In this chapter also definitions and categories of Chemical, Biological and Radiological and Nuclear agents are presented. The most important chemical agents classes are described with short information of methods of actions like nerve agents, vesicants, choking and blood agents as well as toxic industrial chemicals.

In bio agent part short description of bio threats is provided with categorization and presentation of most likely agents to be used. Photos could help recognition of possible threat by medical symptoms.

RN materials and its properties as well as characterization of threats coming from alfa, beta, gamma, neutrons and x-ray radiation are given.

Differences between irradiation (exposure to radiation- not transferable) vs contamination (exposure to radioactive material – transferable) is provided. Use of infographics makes knowledge material more attractive and easier to understand.

More detailed information about specific agents are provided in appendixes 1,2 and 3.

Chapter 4 – CBRN detection technologies – is focused on detection of the CBRN attack or incident. In the first part indicators and symptoms of such an event are listed to detect the thread without any additional equipment. This knowledge could allow faster reaction to the situation and could help organize early evacuation which is extremely important.

Unfortunately not always as some agents could be detected only by dedicated sensors. Requirements and recommend-dation for such equipment are delivered here.

For those more interested in detection technologies Appendix IV was written. This Appendix could be is especially helpful for the people responsible for choosing proper detection technology and particular supplier.

After description of CBRN detection methods importance of self-protection was presented in chapter 5 – Personal Protection Equipment.

The most important categories of PPE, like eye protection, respiratory protection, skin protection is discussed shortly (more detailed information are presented in Appendix V).

Rules and factors influencing proper selection of PPE are depicted.

In the final part of this chapter we recommend use of:

- full face gas mask for managing staff (security and SM management)
- escape hoods for people controlling evacuation
- protection gloves also for people controlling evacuation

Next chapter 6 – CBRN Security approach – was intended to focus SM staff on places or points within SM and in neighbourhood which are vulnerable for CBRN type of attack or incident.

We identified following possible methods (or places) of attack:

1. Parcels/letters
2. Infected persons
3. Fountain
4. Ice rink
5. Unmanned Aerial Vehicle UAV
6. Ventilation system
7. Left luggage/object
8. Vehicle attack
9. Internal installations
10. Nearby Industrial plants and installations
11. Dangerous goods transport in the neighbourhood

Threats coming from position listed above are shortly described.

Tool to self-assess vulnerability to CBRN attack of SM is presented and described detailly. Intention of this tool - Vulnerability Assessment Register - is to help SM management and security make a decision of modifying protection system and where.

Chapter 7 – Prevention – consist of three important parts:

1. Safety systems useful for protection of SM vs crime or terrorist actions
- CCTV
- Access control
- Anti-theft/anti-intruder systems
- Interlocking door system
- Monitoring room

2. Anti-terrorist facility protection
- Bollards
- Anti-terrorist vehicle barriers
- Reinforced landscape objects

3. Useful equipment in case of CBRN attack or incident
- Personal Protective Equipment (PPE)
- Medical Rescue Bag
- Evacuation bag
- Bag for initial decontamination
- Command and control escape case

Short description of each systems or AT facilities is provided. Very important part of chapter 8 are recommendations for equipment useful during response actions after CBRN incident or attack. Those equipment listed in point c. are not very costly but could make evacuation process much easier and more effective and helps during initial decontamination phase – which is crucial the exposed health.

Chapter 8 – Informing and notifying – provides information about proper information management during dangerous incident, both internal, between security and SM workers, and external between SM and emergency services involved (Firefighters, Police, EMS etc.). It is recommended for SM to have Informing and Notification Plan. Means of communications, responsibilities of different personnel groups are discussed.

There is also explained situation how to act in case of threatening information about dangerous item planted in SM. As an appendix VI example of Threatening Information Form is delivered.

Chapter 9 – Evacuation – is about the most important activity during CBRN attack or incident – evacuation. The emphasize was put on differences between well-known evacuation type- in case of fire or terrorist attack with gun, knife or bomb and CBRN evacuation.

The most important difference is the threat could not be visible (like toxic gas cloud) thus detection could be difficult or late and if people are evacuated through toxic cloud it could create even more severe situation Based on information in this chapter existing evacuation procedures could (and should) be updated.

Three phases of evacuation are detailly described:

I. Planning and decision making phase

II. Managing evacuation

III. Assembly points management

Phase I is about gathering information relevant to management of evacuation like – place of attack, remaining time to contact contamination, distance etc. One of important decision during an terrorist attack is to evacuate or shelter in place. Factor influencing decision are discussed as well as actions relevant to CBRN type of attack or incident.

Phase II, due to complexity is divided into 3 stages:

- stage one - evacuation from premises
- stage two - evacuation by emergency routes
- stage three - moving to assembly points.

All stages are described with graphics to help understand the process. Roles and duties for different people during evacuation are presented and discussed.

Phase III, management of the assembly point, is discussed including special factors specific to CBRN attack or incident like wind direction, initial decontamination rules and organization, waste management, contamination spread reduction etc.

Chapter 10 – Procedures. This chapter provides recommendation of procedures for SM. They could be implemented to already existing security documents or procedures - after revision and verification of accordance to local law as each country has own regulations.

All the procedures are divided into two groups:

1. General CBRN procedures

- Searching methodology
- 1-2-3 plus procedure
- METHANE
- Shelter in place
- Initial decontamination
- Remove, remove, remove procedure
- Cleaning surfaces procedures

- Tenants procedures
- Food court

2. Vulnerable points response procedures

- CBRN bomb planting information
- Bomb threat (dirty bomb)
- Left item
- Parcels/letters
- Infected persons
- Ventilation system
- UAV
- Vehicle
- Technical installations
- External threats

Some of the procedures listed above are already recognized and present in SM security documentation but include additional information relevant to CBRN threats.

It is advisable to implement procedures mentioned above into already existing in shopping malls main security plans to create one document covering all security aspects including CBRN issues.

Similarly, it is advisable to include CBRN related trainings in existing training plans. In fact many CBRN related procedures are very similar to general security procedures and some CBRN aspects should be added only (ie. searching, suspicious items, shelter in place etc.).

In presented approach (updating existing documents not creation of new ones and extending existing trainings not creating new ones) ongoing costs of new functionalities could be kept low witch is one of the key factors in business activities.

This handbook provides significant portion of knowledge, covering all information needed to fulfill all the aims of Training Curriculum and to learn all outcomes listed there.

Successful training do not have to consist of all of the content.

End users should feel free to use the Training Curriculum as a tool to create own training program covering only outcomes they are interested in, reducing time and cost needed for the course or dividing it into parts.

Figures

Tables

Graphics

Page	Graphics/Photo name	References
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