Tailored CBRNe protection measures for hotels and conference centres

D.3.1 Recommendations for prevention, protection and response procedures to CBRNe terrorist acts

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Project consortium

Research, expertise, technology providers

End-users

Law enforcement agencies

The material for this publication was developed and reviewed by the HOTHREAT consortium:

Partner organization name	Country
University of Lodz	PL
Dynamic Safety Corporation	PL
Polaris Hospitality Enterprises	PL
Hotel Boss	PL
Safety Core	PL
International Security and Emergency Management Institute	SK
National Institute of Aerospace Technology	ES
Atiram Hotels	ES
The Center for Security Studies	EL
Hellenic Police	EL
Konngruent	RO
Sigoria Security Solutions	PL
Center for Social Innovation	CY
Aphrodite Hills Resort	CY
The Nicosia Tourist Board	CY
Lodz Regional Police Headquarters	PL
Fondazione Safe	IT
Ministry of Internal Administration	PT
Department of Interior of the Government of Catalonia	ES

Table of contents

List of Figures

1. Introduction to the HOTHREAT project

Hotels, leisure, and conference facilities have historically been targets of terrorist attacks, and the threat level continues to rise. Due to its characteristics, this sector is vulnerable to attacks as during the last 25 years over 160 attacks were conducted. Chemical, biological and radiological/nuclear (CBRN) threats are emerging risks that the European public must take into consideration. Notably, the use of those agents can be often combined with explosive devices, leading to CBRNe threats.

The HOTHREAT project aims to address the existing gap in the protection of hotels from CBRNe terrorist threats by bringing together a consortium composed of private and public entities, experts, end-users, security companies and law enforcement agencies (LEAs). Indeed, the Consortium is composed of 19 partners from 8 EU Member States.

The main objective of HOTHREAT is to increase the safety of EU Member States (MS) society from CBRNe threats by targeting hotels and conference centres. To do so, during the project cycle, comprehensive vulnerability and needs analysis will be conducted as well as best practices identification in order to elaborate tailor-made measures for CBRNe protection. The measures include recommendations for prevention, protection and response procedures. Moreover, CBRNe measures include recommendations for the adoption of protective equipment, multi-service communication models, programmes for VIP visits, cleaning services, food defence, epidemiology inquiries and CBRNe emergency application for mobile devices integrated with AR. Finally, training sessions will be delivered for hotel employees through a series of piloting and large-scale exercises to ensure the adoption of high-quality and well-addressed measures.

Specifically, Work Package (WP) 3 is the core of the HOTHREAT project with the aim of creating a comprehensive system supporting hotel and conference centres against CBRNe. This system is composed of 5 guidelines addressing CBNRe risks as follows:

- Recommendations for prevention, protection and response procedures to CBRNe terrorist acts.
- Food protection guidelines.
- Guidelines for epidemiological enquiry.
- CBRNe VIP protection Programme.
- Cleaning services recognition & reaction Programme .

The document at hand represents a key project legacy thus contributing to the creation of a comprehensive system supporting hotels and conference centres against CBRNe risks by providing adequate guidelines.

2. Executive summary

This document provides comprehensive guidelines for addressing chemical, biological, radiological, and nuclear (CBRN) threats in the hotel industry. It outlines the need for a strategic plan and emphasizes the importance of awareness and training to mitigate these risks. The guidelines cover:

1. **Scope and Objective:** Defining the guidelines' purpose.
2. **Strategic Planning:** Necessity for a strategic approach to CBRN risks.
3. **Awareness and Training:** Enhancing awareness and training on chemical, biological, and radiological risks, including specific information on bacteria, viruses, and toxins.
4. **Risk Assessment and Vulnerability Analysis:** Methods for assessing risks and analysing vulnerabilities, especially in intentionally provoked situations.
5. **Security Measures:** Assessing needs, detecting and monitoring threats, using technical equipment, and employing protective gear. This section also details emergency planning, including decontamination procedures for different types of contamination and collaboration with authorities.
6. **Emergency Planning:** Developing a CBRN-specific annex to emergency plans, conducting emergency decontamination, and maintaining crisis communication.
7. **Continuous Improvement:** Regular training, drills, maintenance, inspections, and review processes to ensure ongoing improvements.

The guidelines aim to equip hotels with the knowledge and tools to enhance security and preparedness against CBRN threats, ensuring the safety and well-being of guests and staff.

3. Scope and objective of the guidelines

In our current world, where technological developments continuously evolve, the hotel industry faces increasingly complex security challenges. Incidents such as the radiological disaster of Fukushima in March 2011, the chemical explosion at the port of Beirut during the SARS-CoV-2 pandemic in August 2020, and malicious acts like the Sarin gas attack in the Tokyo metro in March 1995, underscore the potential threats that hotels must be prepared to address.

Figure 1: red cloud indicating chemical elements during the explosion in the port of Beirut in 2020 (source: https://www.dailymail.co.uk/news/article-8595879/Beirut-explosion-Australians-account-blast-ripped-apart-hotel-owns.html)

Figure 2: structural damages to buildings after the Beirut port explosion (credit: dpa/picture alliance)

The growing presence of chemical, biological, and radiological materials in our daily environment for industrial needs, scientific research, or medical diagnostics necessitates a reassessment of threat and risk priorities in the hotel sector. Conventional protection measures alone no longer guarantee sufficient security against malicious groups who are creative and well-informed about the flaws in existing systems.

The risk of harmful materials being diverted for illegal purposes is a significant concern for hotels, given that such actions have been attempted before, and intelligence indicators suggest that certain groups continue their efforts to acquire these products (1). Hotels, often bustling with guests from diverse backgrounds and hosting various events, can be attractive targets for those seeking to make a symbolic statement or cause widespread disruption.

While situations involving chemical, biological, or radiological materials are generally considered low-probability events, the hotel industry cannot afford to prioritize resources solely towards more conventional threats. The potential impact of such an attack would be much greater than a conventional attack due to the long-term contamination capabilities of these materials and the severe psychological effects they would have on guests and staff, who may not fully understand the real dangers.

Certain high-profile hotels and critical infrastructure in the hospitality industry have already implemented additional detection and protection measures to counter these threats. However, significant vulnerabilities still exist in many other hotels, presenting both an opportunity and an easy target for extremists, radicalized individuals, or criminals looking to gain international attention through the media and social networks.

Chemical, biological, or radiological agents have the potential to cause significant harm, especially if used on poorly protected targets that symbolize our way of life, such as hotels. The hospitality industry must therefore adopt a proactive approach to security, implementing

comprehensive risk assessments and robust protection measures to mitigate these threats effectively. Ensuring the safety and security of guests and staff is paramount, requiring continuous vigilance and adaptation to evolving threats.

The threats represented by chemical, biological, or radiological agents are among the major concerns of crisis managers.

Gathered under the acronym CBRN, for chemical, biological, radiological, or nuclear agents, we also often find the acronym CBRNe to add the explosive risk, used to disperse CBRN agents and not as a specific risk. Thus, explosives can be also used as an additional means to disperse the CBRN agent leading to secondary injuries from explosion through its blast and shrapnel.

In the acronym CBRN, the letter N refers to nuclear agent materials whose fission or fusion properties are used to release energy in very large quantities, particularly in nuclear explosions. Given the specific nature of nuclear threats, it will not fall under the scope of this document.

The growing presence in our daily environment of products, dangerous but used for industrial, medical or research purposes, should not make us forget that they can be diverted from this initial use, either by accident or intentionally. This data must change our perception of our priorities of risks and threats and related preventive measures and actions.

The CBRN threats, whether intentional or unintentional, are today considered sufficiently serious for many countries or institutions, civil or private, to equip themselves with means of response dedicated to this type of specific risk, to be able to face them, but also to reassure their population, and to try to deter potential attackers as well.

The massive disorganization capabilities of CBRN agents are often unknown or undervalued by conventional security services, sites open to the public or VIPs. These then represent targets of interest and high value for criminal movements or terrorism because their attack could not be detected or stopped in time and have a much more powerful psychological impact than a conventional attack.

The support of metal detection portals into the sensitive access security systems of many establishments, public or private, has made it possible to strengthen control of the presence of firearms or knives on visitors. But the control of dangerous products in liquid form, such as acidic, corrosive, or even explosive chemicals, avoid this automated surveillance. Only airports have implemented measures that prohibit passengers from carrying all liquids above 100 ml due to potential explosive risks by screening liquids and other equipment as well via chemical detectors[1]. Thus, apart from air transport, access control for a toxic or explosive product in liquid form, especially if it is hidden in food packaging for example, is difficult to achieve.

1 E.g. Smith Detection. IONSCAN 600Portable explosives and narcotics trace detector, IONSCAN 600 is a highly sensitive, non-radioactive, lightweight, portable desktop system that detects and identifies trace amounts of explosives and narcotics. https://www.smithsdetection.com/products/ionscan-600/

Figure 3: an airport chemical detector (credit: https://www.agilent.com/en/solutions/security-defense-first-response/airport-critical-infrastructure-security)

This weakness in CBRN detection around sites that could be targeted is known to malicious groups and could thus be a source of interest and convenience for them. And the reality is that emergency protection and decontamination means are often as rare or poorly known, as advanced detection capabilities.

The characteristics of CBRN substances and their effects on humans, equipment or the environment are poorly understood and are often the subject of disproportionate fear.

The CBRN threat is today an international challenge, and the prevalence of toxic or pathogen agents used daily in our private environment, in industry or research centres and which could be used for purposes diverted from their legal use, increases the probability of use during an attack.

In this context, hotel infrastructures correspond to the definition of potential targets for natural, accidental, or provoked situations involving CBRN type agents, thus making Hotels and conference centres classifiable as sensitive infrastructures.

To be effective, efforts aimed at strengthening the CBRN security of structures open to the public, must focus on specific elements. This document helps identify the main dangerous situations involving CBRN-type materials that a hotel could face. It provides a framework for understanding the risks associated with CBRN agents and assessing existing vulnerabilities in a hotel.

It suggests and proposes possibilities to find material and human solutions, to detect CBRN threats as early as possible and to deal with them as best as possible, with simple means and without ever worsening the situation and minimizing the human and economic consequences.

It seeks to raise awareness among decision-makers by proposing prevention, intervention, and crisis management strategies to circumvent the obstacles and challenges of CBRN threats in hotels

4. The need for a strategic plan

This document presents a comprehensive approach to tailored CBRNe protection measures specifically designed for hotels and conference centres. The content has been meticulously developed based on insights gained from a series of detailed inspection visits and the identified needs of the facilities involved, in particular by taking inputs from D2.2. The inspection visits highlighted various security gaps, best practices, and the essential requirements for enhancing the safety and preparedness of these venues against potential CBRNe threats. These findings have been instrumental in shaping the recommendations and procedures outlined in this document, aiming to fortify the security and operational resilience of hotels and conference centres across Europe.

D2.2 begins with an overview of the WP2 analysis, focusing on identifying the security needs and best practices for hotels and conference centres in relation to CBRNe threats. Objectives include assessing current protection systems, cooperation with law enforcement agencies, training needs, and identifying gaps in security procedures. The primary goal of the visits was to gather information on existing security practices, identify vulnerabilities, and assess the preparedness of facilities for CBRNe incidents. Specific focus areas included building structure, location of security services, quality of CCTV coverage, and the behaviour of staff and clients.

The inspection visits were conducted in several phases, including preparatory research, on-site evaluations, interviews with staff, and post-visit reports. A pilot visit helped refine the approach for subsequent inspections.

The inspections covered a wide range of facilities across different countries, each with varying levels of preparedness and security measures. Key findings included strengths in certain areas, such as fire safety systems, but also highlighted significant gaps, particularly in areas like CBRNe-specific training and communication systems.

The study visits have underlined best practices, gaps and recommendations, as well as detailed recommendations by area:

- **Best Practices:** Some facilities demonstrated strong security documentation, close cooperation with law enforcement, and robust emergency procedures. Others had advanced communication systems and well-trained security personnel.
- **Gaps:** Common gaps included a lack of CBRNe-specific procedures, inadequate personal protective equipment (PPE), and insufficient training for staff on how to handle CBRNe incidents. Many facilities lacked comprehensive evacuation plans and communication systems tailored to emergency situations.
- **Recommendations:** The document advocates for the development of comprehensive security policies, regular training for all staff, enhanced cooperation with local security services, and the implementation of advanced communication and monitoring

systems. Specific recommendations also include equipping facilities with appropriate PPE and conducting regular emergency drills that go beyond fire safety to include scenarios involving CBRNe threats.

Detailed Recommendations by Area:

- **Security Management:** Emphasizes the need for a dedicated security manager and the development of detailed CBRNe response procedures.
- **Personal Protection:** Recommends equipping staff with appropriate PPE and providing regular training on its use.
- **Communication Systems:** Advocates for the installation of Voice Alarm Systems (VAS) and dedicated emergency communication channels.
- **Medical Support:** Suggests establishing first aid rooms, equipping facilities with Automated External Defibrillators (AEDs), and training staff in first aid specific to CBRNe exposure.
- **Evacuation Procedures:** Calls for the development of comprehensive evacuation plans that account for CBRNe scenarios, including the identification of alternative assembly points and the provision of evacuation kits.

This document serves as a crucial resource for enhancing the security and preparedness of hotels and conference centres against CBRNe threats. By addressing the gaps identified during inspection visits and implementing the recommendations provided, these facilities can significantly improve their resilience to such incidents.

It is imperative for hotels and conference centres to formulate a comprehensive security strategy that addresses an expanding array of risks. This strategy must safeguard not only the customers but also the staff, the facilities, and ultimately the reputation of the hotel or the broader group it represents. Each category of risk possesses unique characteristics, necessitating specific countermeasures. It is therefore important to implement general safety measures and subsequently incorporate specific protections against particular scenarios that the hotel seeks to address more effectively.

Hotel security strategy includes establishing safety and emergency procedures to deal with dangerous scenarios. These procedures are particularly designed to deal with fire risks, natural disasters and risks such as earthquakes, floods or tsunamis, power outages, bomb threats or suspicious packages, explosions in the hotel or in the immediate vicinity, etc.

The standard measures recommended and commonly found in establishments include exercising caution when strangers approach a client, particularly on the street, maintaining constant surveillance of belongings and personal items, using evacuation routes to reach assembly areas during an alarm without returning to the room to retrieve personal belongings,

staying away from windows in the event of an explosion risk, seeking cover behind a solid structure during an earthquake, or moving to a high point inland during a tsunami or floods.

None of the measures mentioned as examples address CBRN risks. Until now, CBRN risks have not been integrated into many hotels facilities' safety and security planning. Moving forward, the risk and likelihood of CBRN events should be considered and incorporated accordingly. The threat posed by CBRN agents must now be included in the strategic planning of hotel management and embedded as emergency response procedures, as commonly done for fire response. This strategic integration ensures a comprehensive direction in the development of security policies and programs aimed at enhancing overall safety.

The potential sources of risk to which a hotel is subject may vary with time or the geographic location in which it is located. Policy and program decisions regarding CBRN agents must be tailored in the context of a broader approach to multi-hazard management, whether the hazards are man-made, natural, or accidental. Hazard, vulnerability, and risk assessment methods should be used to obtain a consistent understanding for all hazards, including those from CBRN agents. Once risks from all possible sources are understood, capacity-based planning can be used to reduce CBRN risk.

This comprehensive approach to risk management, including CBRN, will allow stakeholders to redistribute and balance resources, which are always limited, according to the priorities given to the different areas. The basis of this analysis must place the human factor at the heart of the response system. Efficient and interoperable staff are the key to the smooth running of a hotel, including in emergency situations.

Effective staff are those equipped with the necessary tools and training resources and supported by management in their work and efforts. Such staff are responsible for monitoring, undertaking prevention and mitigation, preparing for, intervening in, and recovering from activities necessary to effectively address CBRN threats. The hotel will not create a team dedicated solely to CBRN risk, which is why interoperability is one of the main characteristics of an effective team.

Interoperability between training, tools and equipment, technology and procedures are a guarantee of efficiency and optimization. With these essential elements, the hotel can hope to have technical, operational, and functional interoperability. The hotel staff, who represent its workforce, must be trained, and supported by a modern, dynamic and responsive training infrastructure, according to their specific roles, responsibilities and contributions. Access to appropriate tools and equipment based on capacity levels is also necessary and includes the adoption of new technologies. Interoperable procedures and plans, such as integrated concepts of operations, must be developed and used, to achieve the desired level of resilience.

Considering the characteristics which define all the risks of a CBRN nature, whether the event is of a criminal or terrorist nature, the risk that hotel staff is specifically targeted or that the staff runs into danger during the intervention in an CBRN situation, exists. For the hotel, it is

essential to give priority attention to the safety of their personnel ensuring a capacity to efficiently prevent, mitigate, respond and recover to such threats. The considerable psycho-social consequences of a CBRN event must be included in the hotel's strategic considerations.

All systems and strategies developed at the hotel level should aim to enhance coordination, minimize redundancy, and facilitate efficient communication, thereby bolstering overall effectiveness. Efforts invested in supporting the action plan can serve as a visible deterrent to malicious groups seeking potential targets. Quality assurance needs to be integrated into the hotel's strategic planning process, emphasizing comprehensive documentation and rigorous oversight of all processes, including collaboration and communication. Continuous audits and updates of risk assessments can be streamlined through the utilization of statistical quality control tools. Validating corrective or preventive measures is crucial in recognizing and implementing best practices throughout this process.

The strategy promotes the hotel's vision of integrated capabilities by defining a scalable, responsive, dynamic, sustainable, and evidence-based approach for all stakeholders who would be faced with an CBRN situation. This approach is based on conventional components of the management of potential emergency situations (prevention/mitigation, preparation, response, and recovery) and can be based on key strategic objectives:

- **Leadership**: to guide the coordinated development of programs at all hierarchical levels of the hotel, to foster and promote CBRN resilience.
- **Risk management**: to integrate CBRN threats into a coherent hotel risk management approach, including robust hazard, vulnerability, and risk assessment methodologies.
- **Capacity-based planning**: to inform program and investment decisions.

5. Awareness and Training

Situations involving CBRN agents become more devastating when there is a lack of organization. It is crucial to recognize that well-informed crisis managers now consider CBRN threats as significant as emerging threats like cyber-attacks and the advanced capabilities of drones used in direct attacks. Prioritizing CBRN threats enhances preparedness and ensures an effective response. The evolution of technology and the changing needs of society have altered our environment. The peaceful use of chemical, biological, and radiological agents is increasingly prevalent, raising the risk of these agents becoming threats.

However, these agents also possess a disruptive potential that could be unintentionally released or deliberately triggered, necessitating ongoing control and surveillance. Behind the CBRN acronym lie distinctive technical fields, both fascinating and feared. It is crucial for the teams responsible for safety and security in the Hotels to fully understand these fields. Additionally, those familiar with the actual capabilities of CBRN agents must not underestimate their impact as perceived by a less informed public.

To fully understand the associated risks, awareness-raising is needed.

5.1. Awareness of chemical risks

Chemical substances are used by many industries or sectors of activity, and they are also found in our everyday domestic environment. Industrial products are often much more concentrated in toxic agents than household chemicals, such as bleach or pesticides and they are available in gaseous, liquid, powder, or granular form. “A similar situation could also arise in the event of an accident involving the transport of CBRN products close to a hotel or in the direction of the wind”.

Chemical incidents are generally detected very early because the appearance of symptoms rather quick. In addition, numerous indicators, visual or olfactory, are often detectable by a person who has been trained and who is aware of this type of symptoms.

Detectors are widely available on the market and, depending on the technologies used, offer wide detection possibilities for the different types of chemicals or their physical state, liquid or gas, including drugs and explosives.

Figure 4: Chemical risk symbol (credit: UN Handbook for CBRN risks)

5.2. Awareness of biological risks

Biological agents are naturally present in our environment and some of them, called pathogens, can cause diseases in humans or animals. In this category it is possible to find bacteria and viruses to which toxins have been added, which are toxic substances produced by living organisms.

Biological agents are the most difficult to detect in the CBRN field and very small amounts can cause infection and require a very specific method of detection, analysis, and identification. Symptoms can appear after several hours for intoxication, or several days for viruses or bacteria. This delay between the contact with biological agents and its victim(s), the appearance of symptoms, called the incubation period, increases the potential dispersion of the disease due to the lack of isolation and detection of the first victims until the discovery of the disease.

Biological agents do not really have a characteristic signature and are most of the time without colours or odours that would allow or help them to be identified. Some infections can be transmitted passed from a person to another person. Some only threaten humans, others only animals, and others can be transmitted from humans to animals and vice versa. Biological agents are often sensitive to ambient conditions of light, heat or humidity and their survivability in the environment, with rare exceptions, is very limited.

Figure 5: Biological risk symbol (credit: UN Handbook for CBRN risks)

5.2.1. Bacteria

Some bacteria are contagious, and some require a host cell to reproduce. In the absence of their ideal living or development conditions, certain bacteria can transform into spores and survive in this form for several years. The treatment against bacteria is the medical prescription of antibiotics. However, some bacteria have acquired resistance to antibiotics. Nowadays, antibiotic vaccines are being developed, particularly to combat fatal diseases in the absence of rapid treatment.

5.2.2. Viruses

Viruses can only reproduce inside a host cell. Some viruses only target one species, humans, animals, or plants, while others can spread between species. Those which are transmitted from host to host, provoke so-called contagious diseases. Viruses can only reproduce inside a host cell but can be transmitted host-to-host. Viruses are not sensitive to antibiotics. There are vaccines against certain viruses as well as antiviral therapies, but natural mutations in viruses can make these treatments less effective.

5.2.3. Toxins

Toxins are toxic substances produced by living organisms, such as plants, animals, snakes, shellfish, or microorganisms. They are classified as biological agents because it is not possible to reproduce them nowadays in the laboratory, but they are not living organisms like bacteria or viruses. Toxins cannot spread from one organism to another and therefore do not cause contagious disease. Toxins do not reproduce even inside a host cell of a victim they have infected, and do not have an incubation period between contact with the victim and the appearance of symptoms, which can appear within a few hours or a few days at most. Antibiotics and antivirals are not effective against toxins. However, certain toxins can be treated with specific antitoxins and vaccines.

5.3. Awareness of radiological risks

Radioactivity is a natural property of certain materials which emit several types of radiation and whose intensity can present health risks. There are different types of radiations, which will be explained later in this document. Radioactive materials come in various physical forms,

solid, liquid or powder, of variable colour, and are commonly used in many industrial, medical or research processes. Specific detectors are necessary to detect the presence of the radiation which is invisible and odourless.

Figure 6: Radiological risk symbol (credit: UN Handbook for CBRN risks)

Figure 7: example of radioactivity detector

Furthermore, any symptoms of exposure do not appear spontaneously, and sometimes a long time after exposure, depending on the power of the radioactive source used and the duration during which the victim was exposed to it. When exposure to radiation occurs remotely, without contact between a person and the radioactive source, it is a question of irradiation[2]. When the person is directly in contact with radioactive particles in the form of powder or liquid, on the skin or clothing, it is a matter of external contamination[3]. If these particles have penetrated inside the victim's body, it is a matter of internal contamination.

2 Irradiation; Occurs when an object is exposed to a source of radiation outside the object. Doesn't cause the object to become radioactive and can be blocked from the object with suitable shielding. Stops as soon as the source is removed

3 Contamination: Occurs if the radioactive source is on or in the object. A contaminated object will be radioactive for as long as the source is on or in it Once an object is contaminated, the radiation cannot be blocked from the object It can be very difficult to remove all of the contamination

Categories of radioactive sources are used regularly in many industrial sectors, or in hospitals, universities and scientific or medical research centres, or sometimes even in older generation smoke detectors that can still be found in some hotels.

The level of security for accessing this type of source varies greatly, but it is not always difficult to gain possession of them for an individual who has criminal intentions and wants to use them for lawbreaker purposes. However, it is unlikely that a radioactive source that would be used to attack a hotel would be powerful enough to kill or seriously injure people. If a bomb was used to disperse radioactive agents, the main danger for victims would be much more linked to the explosion (injuries linked to the blast or shrapnel) than to radioactive contamination.

However, the contamination would be likely to generate great panic and would certainly render the hotel's premises and equipment unusable because customers would probably refuse to reuse them for a long period.

5.4. Differences between CBRN risks

Each CBRN agent type has its own characteristics, with specific contamination capabilities over time and space.

When a CBRN incident occurs, whether the dispersion method is simple or accentuated by the explosion of an improvised device, an initial isolation zoning must be put in place to prohibit access to the contaminated area. An additional system, which considers the wind direction when the incident is in the open air, must also be thought of and applied. This aspect will be seen in detail in a dedicated part of this document.

To protect against the harmful effects of CBRN type agents, specific means of protection must be put in place. In the event of contamination, an emergency decontamination process must be implemented as swiftly as possible before protective measures can be established. All these concepts must be known and understood by all hotel teams in relation to personal safety. They will also be developed in this document.

CBRN agents can be dispersed by air, food or water or any other drinkable product, or on surfaces we may be in contact with. The possibilities for spreading of these agents are numerous and range from the simple opening of a container or the use of a commercial type of spray, to more elaborate methods such as the use of an explosive bursting charge[4], for greater dispersion and instant diffusion.

It is important during CBRN risk awareness sessions that hotel staff learns to recognize certain indicators which may be characteristic of the preparation or start of an attack or incident

4 Explosive bursting charge; The explosive charge within a shell is known as the "Bursting Charge" or, more simply, as the "Burster." Some of the more well-known: Black Powder or Gunpowder - Used as the burster in most shells prior to the early years of the twentieth century.

involving CBRN agents. This can be achieved by carefully observing and considering relevant sights, signs, symptoms, smells and sounds which may indicate the presence of CBRN agents:

Guidelines for CBRN recognition	
SIGHTS	Is there some evidence of hazardous materials at the scene or nearby? Look for the presence of technical/hazard signs/number(s) or data sheets; hazardous material containers; vehicles or warning signs; premises that may store or use hazardous materials… What can you see that may explain the situation? The absence of a simple explanation could indicate the presence of hazardous materials as a cause.
SIGNS	Are there certain signs of the possible presence of hazardous materials? Unexplained vapor or mist clouds; oily droplets on surfaces or water; dead or distressed animals or birds; withered plants; unusual materials or equipment at the scene.
SYMPTOMS	Are there multiple casualties with unexplained symptoms or symptoms that may indicate the presence of hazardous material? Irritation of the skin, eyes, airway; breathing difficulties; nausea, vomiting, sweating; pinpoint pupils or blurred painful vision; twitching, fitting or unconsciousness; unexplained fatalities.
SMELLS	Are there any unusual smells, or reports of smells, that do not fit the situation? Smell of a swimming pool, explosives, almonds, ammonia, fuel, burning.
SOUNDS	What can you hear and what are the reports of any unusual sounds from other people from inside any buildings, vehicles, containers or bags? A hissing sound/escape of gas from somewhere; breaking of glass inside a rucksack; a firework, shot or explosion.
A combination of 2 or more sights, signs, symptoms, smells or sounds significantly increase the likelihood that CBRN materials are present.	

5.5. CBRN Risk Training

In the general consideration of risks, it is essential that the staff who works in hotels is, at a minimum, aware of the first signs of an attack or exposure to CBRN agents and that this knowledge is part of its general safety training course. If the hotel puts in place specific equipment of detection, protection or emergency decontamination, all staff on duty must be able to use them at any time and know all the emergency procedures associated, including and especially evacuation procedures. Here's a list of some recommendations:

Staff Awareness and Training:

- Ensure that all hotel staff, including reception, maintenance, and other departments, are at least aware of the initial signs of an attack or exposure to CBRN agents. This knowledge should be integrated into the general safety training courses.

Use of Equipment:

- The use of any CBRN equipment from untrained and unspecialized personnel is discouraged. The main responsibilities of hotels staff is to develop a capacity of implementation of emergency procedures. Please remember that PPE and detection equipment, if used incorrectly, can lead to a false sense of security. Only use it if you have been trained.

Access to Protection Equipment:

- Staff must know the locations of all CBRN protection equipment and understand how to access them, even if these are stored in secured premises.

Training and Refresher Courses:

- Regular initial training, followed by periodic refresher courses, should be established and recognized within the company. These training sessions should contribute to the career development of the staff and must be regularly updated.

Practical Simulation Exercises:

- Conduct practical incident simulation exercises following training sessions to ensure staff can apply their knowledge in real-world scenarios.

Formation of a 'Project' Team:

- Establish a project team led by a CBRN situation manager, supported by representatives from security, logistics, and other key operational areas of the hotel. This team will oversee identifying needs and compensating for vulnerabilities related to potential local risks.

Procedures Implementation:

- Hotel operators should implement the procedures developed within HOTHREAT project, into their own organization security and/or emergency procedures (safety book, emergency book).The procedures from project HOTHREAT are based on best knowledge of the CBRNE experts but when implementing country specific regulations must be taken into consideration.

Content of Training:

- The Training Curriculum together with the handbook covering all the topics needed was developed within the project HOTHREAT. The Training Curriculum has modular design so the hotel operator could tailor the trainings to own needs. The content of the

training is relatively large so the training plan should be developed be hotel operators to cover all relevant knowledge and skill and to sustain competency (to repeat crucial skills training).

Crisis Communication:

- Although crisis communication should be managed by dedicated personnel specially trained for this role, all staff should have basic knowledge of crisis communication as part of their training.

Advanced Training Modules:

- Staff who show the most interest or aptitude during awareness or training sessions should have access to more advanced technical and educational training modules. These individuals can serve as key relays to ensure the maintenance and reinforcement of knowledge among other staff between training periods.

6. Risk Assessment and Vulnerability Analysis

The risk assessment is an important step in the consideration process to protect against CBRN and associated hazards.

These risks can result from unintentional situations during natural disasters such as an earthquake near a chemical industrial installation for example, from an accident (fire, explosion, etc.) or from intentionally provoked situations, criminal or terrorism acts, with or without complicity of personnel working within the targeted facility.

		Consequence				
		Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
	4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
	3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
	2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
	1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5

Figure 8: Basic matrix of risk assessment

6.1. Risk Assessment

Natural or accidental situations: faced with natural or accidental risks, it is necessary to map the environment of each hotel and to identify the installations containing chemical, radiological, or biological materials for industrial, medical or research needs. Materials of this type that could also be present in the hotel have been included in this study.

Chemical products held in significant quantities in the hotel for cleaning, disinfection or swimming pool maintenance purposes must in fact be considered in the risk assessment. Their storage locations must be clearly identified and secure, and the movement of products during

their use or their logistical replenishment must be managed by a strict process established upstream.

Hotels located in areas with high seismic activity or subject to major natural risks such as volcanic eruptions or regular floods must carry out this study considering this type of local risk. The assessment must be regularly review and updated, particularly during major modification in the status quo

The installation of a new industrial, medical or research facility, in an area close to the hotel, and producing, handling, or transporting chemical, biological or radiological agents is a valid reason to conduct a new risk assessment for the hotel.

The notion of near perimeter is, however, relative. CBRN type agents when dispersed in the environment in the form of gases or particles can travel long distances in kilometres, when transported by the wind, or penetrate groundwater when transported by rain or runoff.

6.1.1. Intentionally provoked situations

The inventory of possible intentionally provoked situations requires considering the political, social, and economic situation in which the hotel is located. Instability in these areas is likely to give rise to movements of protest or political tensions and expectation with violent actions. Attacks using chemical, biological, or radiological materials are relatively unlikely. However, they are among those with the most significant psychological and economic impacts with a very high possibility of cross contamination and thus spreading much faster.

Indeed, the possible contamination capacities of CBRN, on people, equipment, or installations, and on the environment would lead to serious and very long consequences and constraints, in terms of crisis management. In addition, the public's poor knowledge of CBRN risks is likely to awaken ancestral fears of certain past events, from epidemics of the Black Death to the Chernobyl disaster, including the gas attacks of the World War One in Europe.

Since terrorist groups are primarily seeking a strong impact during their action, CBRN agents, which are sometimes relatively easy to access, can offer this large-scale media and visual opening. During wage demands, striking employees have already threatened to explode the storage of dangerous products, or to dump them into the surrounding waterways, immediately drawing the attention of the media and social networks to their extraordinary blackmail. This possible mode of action, including by hotel staff, if the social situation is unfavourable to them, and this type of threats, must be considered during the risk assessment.

The security systems put in place to protect or secure critical installations can today be circumvented either by means of computer hacking, the use of drones to avoid the field protection, or with the complicity of a staff member who will neutralize the protection measures in place, just before the attack. Once again, the risk assessment for a hotel must be

updated regularly, particularly when the political, social, or economic situation changes significantly, or when incidents of this nature occur in other hotels, whether part of from the same hotel group or not.

6.2. Vulnerability Analysis

Vulnerability analysis is the continuation of risk assessment. Therefore, Hotels must identify vulnerabilities in protection or security measures, before it can be exploited by malicious actors, whether external or internal to the establishment. These vulnerabilities are weak points can disrupt the optimal functioning of the hotel.

It could provoke an accident, a malicious act or allow toxic chemical, biological or radiological products to be dispersed in the hotel or its surroundings, cause contamination of customers and staff, in the hotel's infrastructure, and facilities, including sanitary or food facilities, or on the environment. When new vulnerabilities are discovered, it is essential to fully identify them and consider the need to correct it before being exploitable to enable an attack on the hotel.

It is also important to work jointly with other hotels because the issues are usually the same regarding vulnerabilities related to standard and generalized methods of building construction, the integration of ventilation, or air conditioning systems, design of entry points, management of traffic in the corridors, and evacuation routes in the event of an alert. By collaborating with similar establishments, a hotel can improve its protection by sharing its practices, its selection in terms of available resources and the risks it has identified, including the risks associated with CBRN agents such as the risk explosion, the thermal risk of a fire, the lack of oxygen, etc.

The situations that have been identified in the assessment must be considered to create the training programs for hotel staff in charge of security and be a source of inspiration to for the scenario of CBRN simulated situation exercises.

Also, the questions outlined in Annex A and C of D2.1 could serve as a comprehensive vulnerability assessment tool. These questions aim to gather critical information on existing security measures, policies, and response procedures in place at hotels and conference centres, specifically focusing on CBRNe threats. The data collected through this assessment can identify security gaps, inform training needs, and enhance emergency preparedness, making it an invaluable resource for improving the overall safety and security of such facilities.

Summary of Annex A - Tailored CBRNe Protection Measures for Hotels and Conference Centres

T2.2 Desk Research - Hotel and Conference Centres Protection Survey

General Information

- Collection of basic details about the hotel or conference center, including name, location, and contact information.
- Information about the respondent's role in the organization.

Familiarity with CBRNe Threats

- Questions assess the familiarity of the staff with CBRNe agents and whether the facility has experienced any related incidents.

Security Policies and Measures

- Inquiry into the existence and scope of documented security policies, specifically regarding CBRNe threats.
- Questions about the specific measures and procedures in place to address such threats.

Access Control and Checks

- Examination of procedures for vehicle checks, guest access control, and checks on catering services during events to prevent the introduction of hazardous materials.

Prevention Measures

- Questions about procedures for ensuring food safety, checking for hazardous materials, and the protection of HVAC (Heating, Ventilation, and Air Conditioning) systems.

Emergency Response Procedures

- Inquiry into whether there are established emergency plans for CBRNe incidents and details about these plans.

Training and Awareness

- Questions regarding the frequency and scope of CBRNe-related training provided to staff.

Legislation Awareness

- Assessment of the facility's knowledge of national or EU legislation related to CBRNe security measures.

Good Practices and Guidelines

- Inquiry into awareness and implementation of best practices or guidelines for CBRNe security.

Identification of Gaps and Needs

- Collection of information about perceived gaps in current CBRNe security and suggestions for improvements.

Summary of Content on Annex C - Inspection Visits and Interviews

- **Objectives of Inspection Visits**
- Gathering best practices and vulnerabilities.
- Identifying strengths and weaknesses in emergency preparedness, security staff, equipment, and technical solutions.
- Evaluation of cooperation and communication with external services.

Interview Focus Areas

- General management's understanding of CBRNe threats and their involvement in emergency preparedness.
- Security staff's training, organization, and response capabilities regarding CBRNe incidents.
- Procedures for handling first aid, suspicious mail, abandoned parcels, and security searches.
- Details on evacuation plans and procedures, including equipment and coordination with external services.
- Assessment of fire safety, access control systems, and CCTV coverage.
- Evaluation of training provided to staff on general security and specific threats like CBRNe.
- Examination of communication systems within the facility and their compatibility with external emergency services.
- Cooperation with external security services and agencies, including any existing agreements or exercises conducted.

These points offer a structured approach to assess and enhance CBRNe protection measures in hotels and conference centres, ensuring a higher level of preparedness against potential threats.

7. Security measures

Following the assessment of vulnerabilities, it is important to coordinate all existing security measures to ensure the protection and reassurance of both customers and staff. Additionally, these measures should be improved to address or mitigate the hotel's weaknesses and potential vulnerabilities.

The first measures are intended to prevent unwanted intrusions into establishments while limiting constraints and inconvenience for customers as much as possible. Secure fences and gates are often used, and their crossing is permitted only for people carrying specific badges or keys. Rear entrances must have the same level of protection as the main entrances in order to provide full protection to the establishment. These elements of prevention contribute to deterrence, as much as intervention and the search for intelligence by the hotel security services.

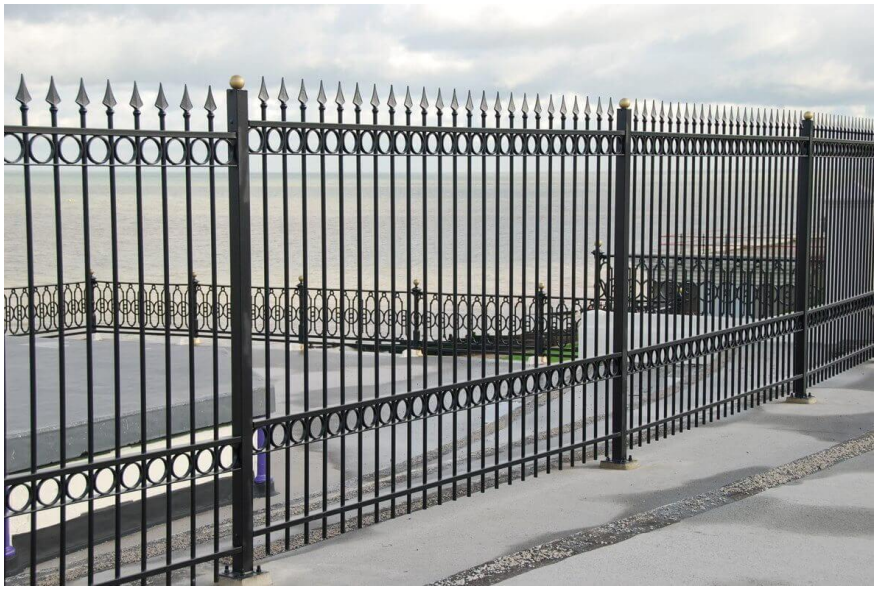

Figure 9: decorative/ornamental security fences for the external perimeter

Figure 10: security gate accessible only with specific badges

Entrance security can be reinforced by detection gates intended to check the absence of firearms or bladed weapons, or explosives on people or in their luggage. It is also possible that vehicles accessing the hotel's car parks are checked by security agents, with mirrors to be sure that no explosive is hidden under the chassis or in the vehicle. It is also possible to consider canine units with dogs able to detect explosives. Nevertheless, constant presence or frequent deployment of canine units in a hotel/touristic context could be considered unattractive to customers and results on a higher level of anxiety for a low probability risk.

Figure 11: Metal detector placed at a hotel entrance

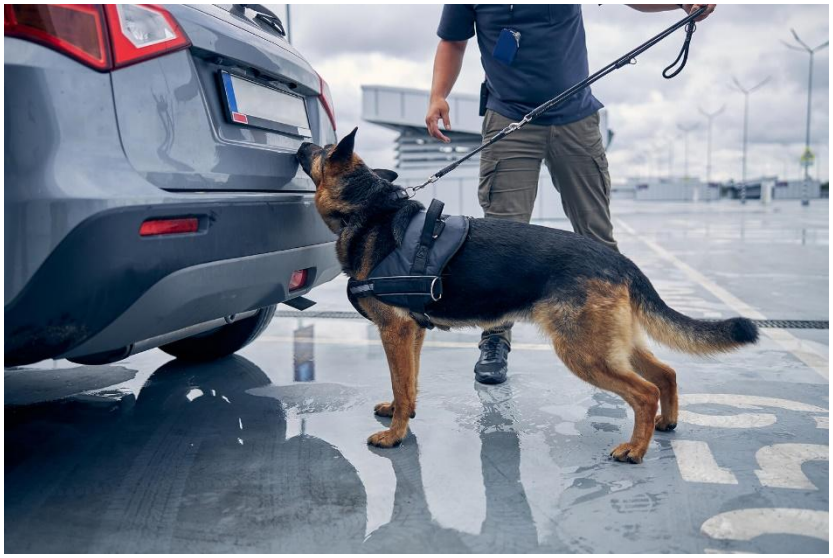

Figure 12: canine unit

The elevators, which provide quick and sometimes discreet access to the different levels of the hotel, can be secured so that access to the floors is only possible with the electronic badge of a corresponding room.

Figure 13: specific badge allowing people to reach the desired floor

A video surveillance system is often set up around the hotel, to monitor access points, as well as the main passage locations such as the reception, corridors, elevators, etc. Dining rooms can also be placed under video surveillance. More rarely and for reasons of confidentiality, meeting or conference rooms are kept under constant video surveillance. Customer rooms, for obvious reasons of privacy, are never equipped with video surveillance.

Smoke detection systems, often linked to automatic sprinkler and extinguishing devices, are mandatory in many establishments. Fire extinguishers as well as complete water supply systems are put in place to fight any outbreak of fire as quickly as possible.

Figure 14: example of a smoke detector

All the security measures just described will probably not detect the arrival in the establishment of a radioactive source or a toxic chemical product in a client's personal belongings. An envelope, letter or package addressed to the hotel or to a guest, and containing a toxic product would probably not be detected before opening.

Atmospheric contamination by a toxic substance, whether in open and outdoor locations of the hotel such as gardens or interior courtyards, or in closed and indoor areas such as corridors, meeting or dining rooms, and underground car parks, or even through ventilation or air conditioning systems, may not be promptly detected or recognized as a threat.

The contamination of food, especially by biological or radiological agents, intended for common dining rooms or distributed during receptions or conferences, is a process that has been utilized and is nearly imperceptible without specialized technical equipment.

The same applies to the contamination of water, distributed via through the water system which connects all parts of the hotel, or the drinks, in bottles or glasses, proposed to customers.

There are very few measures currently in place to detect the almost invisible risks of CBRN, once the toxic products are inside the hotel.

7.1. Needs assessment

Following the risk assessment and analysis of the vulnerabilities of the security systems already existing in the hotel, it is appropriate to conduct a needs assessment to strengthen security and thus limit or minimize the possibilities of a CBRN attack or its effects.

Prioritizing the organization of awareness and training sessions on CBRN risks for hotel staff is essential to ensure that people remain at the forefront of the hotel's protection system. The hotel itself will never be a dedicated structure for detecting and protecting against CBRN risks. This priority should be reinforced by conducting practical exercises regularly and on predetermined dates known to the staff.

The establishment of a project team, with a manager assisted by referents, must be proposed to the human resources department to conduct the CBRN evaluation. This can be useful to assess vulnerabilities and integrate mitigation strategies and related training programs, including drills. Trainers, selected personnel from among the best elements of the initial awareness or training sessions, will ensure that capacities are maintained in the field for the hotel.

To detect the presence of CBRN agents in the hotel at the earliest possible stage, enhancing the detection of indicator signals - visual or olfactory - which should be included in training courses can be supplemented by technical equipment and specialized detectors. CBRN detectors should primarily be positioned at the hotel entrances, including service entrances, even if they are exclusively reserved for hotel staff. The assessment of the detection devices that are needed should cover as much as possible the different types of chemical, biological or radiological agents, whether in solid, liquid or gaseous form.

Priorities must be focused to the main threats because covering the entire CBRN field is not possible. Hence, a risk assessment should be also including likelihood of certain events to occur.

If foreseen, the budget that will be allocated to this expense must cover the costs of installation, possible calibration, maintenance, and technical training of the personnel in charge of their implementation.

In case of a real CBRN alert, or just a supposed one, various protective measures must be planned. For a hotel, they include basic protective equipment to move customers and staff in a safe place if necessary. These CBRN protection equipment, as well as the level of CBRN protection, are to be defined according to the needs identified locally and must be stored near places of potential use but without being visually accessible to the public. Indeed, unlike fire protection systems whose visibility is widely accepted, CBRN protection equipment located in a visible place for customers would very likely be a source of concern and would have effects opposite to the desire to protect people. Also, in case of malicious intents, the exhibition of such equipment might provide advantages to the attacker.

Long-term storage of CBRN protection equipment must respect conditions of temperature, humidity, and exposure to light. These parameters must be considered before acquisition and are indicated in the technical data sheet for each equipment. When purchasing protective equipment, enough items must be provided for the operational needs of the hotel but also for the needs of instruction and practical training of staff, in dressing and undressing operations.

It is very likely that during contact with CBRN type materials, the detection of the threat will be at the same time as the contact or even after it. This means that no protection could be put in place in time and that emergency decontamination must be carried out on people who were contaminated in the first moments.

The effectiveness of these emergency measures depends on the speed with which they were carried out and respecting a process that guarantees the limitation of the dispersion of contamination. Simple equipment, already available in the hotel, can be used while respecting certain precautions. Undressing followed by rinsing with water is one of the basic principles of emergency decontamination.

More specific solutions, available on the market, should be studied if the hotel wishes to increase its response capabilities to an CBRN incident. These include chemical decontamination kits, which are very easy to use. Certain equipment already available for the usual operation of the hotel and its security can be reviewed, adapted, or directly integrated into the CBRN protection system.

Visual marking of evacuation routes in the event of a fire is an example, as are containment or assembly zones in the event of natural disasters such as tsunamis, earthquakes, or volcanic eruptions. The hotel's alarm system, sound, or light can also be used to raise the alert in the event of a CBRN incident and start the evacuation of the premises. Please note that CBRN evacuation is different from fire evacuation so different actions should be applied (like different sound for CBRN evacuation, alternative route for it, own staff directing people to safe places etc.).Wrong evacuation (via contaminated zone) could make situation much worse. When not present, installation of emergency communication devices (or speakers) should be considered. CCTV surveillance systems can be used to detect suspicious behaviour of an individual in the establishment, or to monitor an ongoing crisis remotely and securely.

An emergency plan specifically tailored to CBRN events should be developed, disseminated, familiarized with by staff, and subjected to regular testing and review. While its framework can derive from other emergency plans within the hotel, the absence of a dedicated CBRN emergency plan necessitates, at the very least, the integration of a CBRN annex into the existing general emergency plan.

Pocket-sized booklets containing all the information useful to remember for detecting a potentially CBRN risk situation and taking the first emergency measures can be written and distributed to staff who may be confronted with it.

For customers, general explanatory sheets can be written in several languages and distributed during specific incidents. This action often makes it possible to limit certain panic movements and avoid risky behaviour.

7.2. Detection and Monitoring

Continuous monitoring of installations is essential if the hotel wants to ensure maximum security. It consists of installing CBRN detectors in strategic areas of the hotel, placing effort on all entrances and all accesses that communicate with the outside.

In the event of the presence of CBRN agents, detection must be very fast but also as reliable as possible to avoid false alarms, or repeated alarms. The detection equipment must be sensitive enough to be triggered in the presence of a real threat even if it is a lower one. Detection must use simple processes both in their daily implementation and in the interpretation of the results. There is no universal detector that can detect all CBRN products regardless of their forms, solid, liquid, or gaseous. Reliable detectors available on the market are often specific to a single type or family of CBRN family.

CBRN detection implemented in and for a hotel must give a general and non-specific alert signal, in contact with a toxic agent, as quickly as possible. It is important to understand the presence of an immediate danger, before knowing all its technical characteristics, as the first emergency measures to take being the same.

When certain CBRN agents produce visual or olfactory effects, particularly during the dispersion of chemical agents, raising staff awareness of CBRN risks can facilitate timely response by confirming the presence of danger or providing initial information about its nature. Awareness-raising and training sessions conducted for hotel staff should encompass these recognition signs so that they are recognized as indicators of suspicion by the staff. The visual detection of a CBRN danger by hotel staff is possible if they manage to interpret the information they receive or perceive as potentially being linked to a suspicious CBRN situation. The presence of suspicious products on the ground or on surfaces can be a first sign of danger or contamination. A cloud of gas, coloured or not, in the hotel is also a strong sign that should not be overlooked. Gas diffusers discovered next to hotel air conditioning or ventilation systems should be reported immediately.

A container with the international symbols of chemical, biological, radioactive, corrosive, toxic or other danger, must be identified as a potential threat by hotel staff and trigger an alarm or at least an immediate report. A release of heat or an increase in temperature, without an apparent source of heat, should suggest a chemical reaction in progress, or the presence of a radioactive source of high intensity.

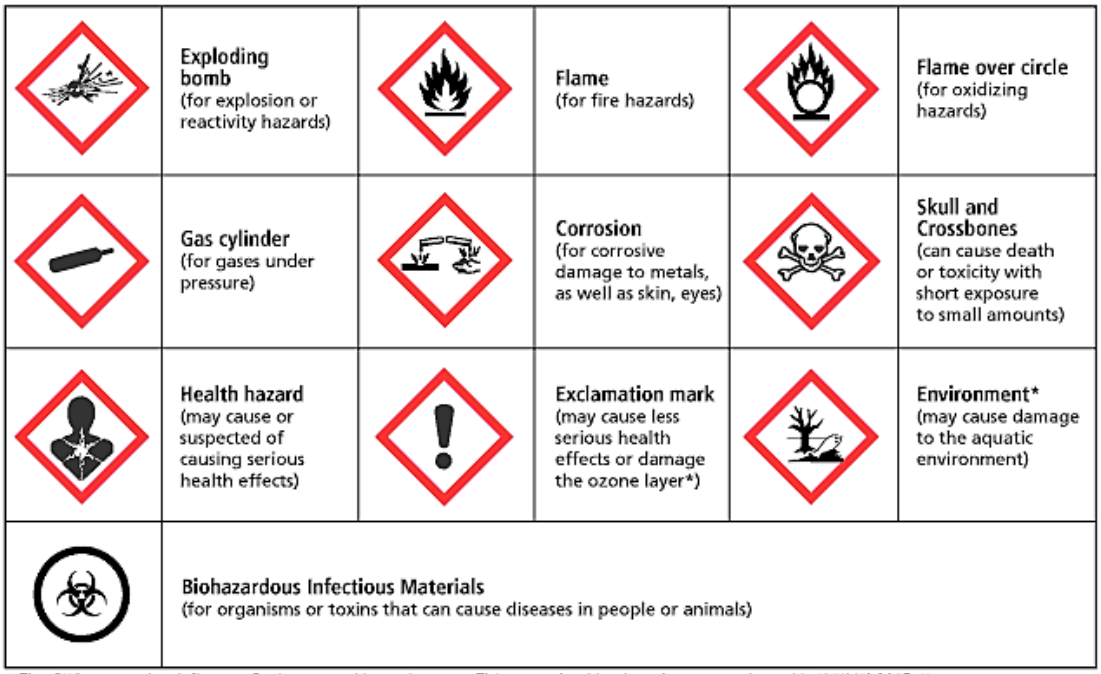

Figure 15: example of hazardous materials symbols

Figure 16: example of more complex and complete warning symbols

The sudden emergence of identical symptoms in several people should immediately indicate the appearance of an abnormal situation and attract attention, while triggering the pre-set emergency procedures and reactions by the staff as well as informing the authorities accordingly. It should be noted, however, that in certain cases the appearance of symptoms is not immediate, particularly for certain radiological or biological situations, and that this indicator cannot be retained as an absolute criterion.

A sudden change in the colour of vegetation or the presence of several dead animals, domestic or wild, small, or large, must be reported immediately. Olfactory detection is also important, and any abnormal odour should be considered suspicious. Some products have very characteristic odours, often unpleasant or disturbing, sometimes irritating.

These basic notions of CBRN detection should be part of the very first awareness training courses. Common sense is often a good way to enable rapid detection, if the hotel agent, once again, has been made aware of the signals that can be visible at the very beginning of contamination by CBRN agents. Even a slight explosion, the sound of a vaporizer or a spray must attract attention. An individual with suspicious behaviour, refusal to submit to a baggage check, or who provides implausible explanations to the questions asked of him, must focused the attention of hotel staff who must immediately report him to the security service or its management.

7.3. Technical Equipment

The technical equipment to detect CBRN agents are specific and must be selected according to the type of detection that the hotel wishes to implement and its needs. The equipment must be used in accordance with the manufacturer's instructions and checked regularly. People who handle technical equipment must undergo dedicated training and obtain certification.

7.3.1. Radioactivity Detectors

Radioactivity detectors make it possible to measure ionizing radiation emitted by radioactive sources. They exist in the form of handheld or portable devices, or fixed portals installed at strategic points chosen by the hotel.

Each radiation has its specific characteristics, which modifies their mode of detection.

- Alpha radiation: Alpha radiation has very low penetrating capabilities but is very harmful if found inside the human body, after being inhaled, ingested, or injected. The Alpha detection is long and difficult because the appropriate detector must be located a few centimetres from the source to be able to detect its radiation. This criterion is limiting, especially when the surfaces to be controlled are large.
- Beta radiation: Beta radiation also has low penetration capabilities and is very easily stopped by thin thicknesses of materials, even not very dense. Detection of these signs is also limited to short distances from the source and requires appropriate detectors or

specific probes. Detecting them over large surface areas presents significant challenges.

- Gamma radiation: Gamma radiation can pass through matter and travels great distances. Gamma detection is relatively easy, which is an advantage given the potential danger.
- X-rays radiation: X-rays radiation is often found in baggage screening devices at hotel entrances, which have protective screens inside the device, so the radiation cannot come out, and the staff can handle them without danger of irradiation. Note that for electrical devices that generate X-rays, simply unplugging the device renders it harmless. This criterion makes it unique compared to the other types of radiation seen previously and which do not need an electrical power supply to be generated by radioactive sources.

Figure 17: portable Geiger counter

All these radiations are not detectable by human senses but can be detected by dedicated devices. A complete range of detectors is available on the market, with or without identification of the radioactive element, in addition to the radiation it emits. Detectors are essential for monitoring the natural or usual level of radioactivity in a location and can measure any unusual variations. Geiger counter is a main type: cheap to procure, portable, easy to use and could give a first, fundamental step in CRN detection. It should be noted, however, that certain medical therapies involve injections of solutions with radioactive elements, and that a hotel guest who benefits from them could trigger alarms by approaching a detector. The device operator must be trained to recognize this type of situation, and not consider it a hostile

situation. Good calibration of the devices at a level compatible with a strong measurement variation will allow detection values corresponding to a real threat to the hotel.

Given the existence of natural exposure, a precise assessment of the level of natural radioactivity of the hotel and its immediate environment must be carried out. It will depend on the location of the hotel, but also on its altitude and the construction materials used, such as certain granite for example. These parameters determine the normal level of radioactivity at a specific location, called radioactive background. This initial technical measure is essential to avoid triggering an alarm from a radioactive detector configured at another location, and which detects a higher threshold when it is only the background noise of the location of its new measurement.

However, any increase in background noise should be investigated immediately.

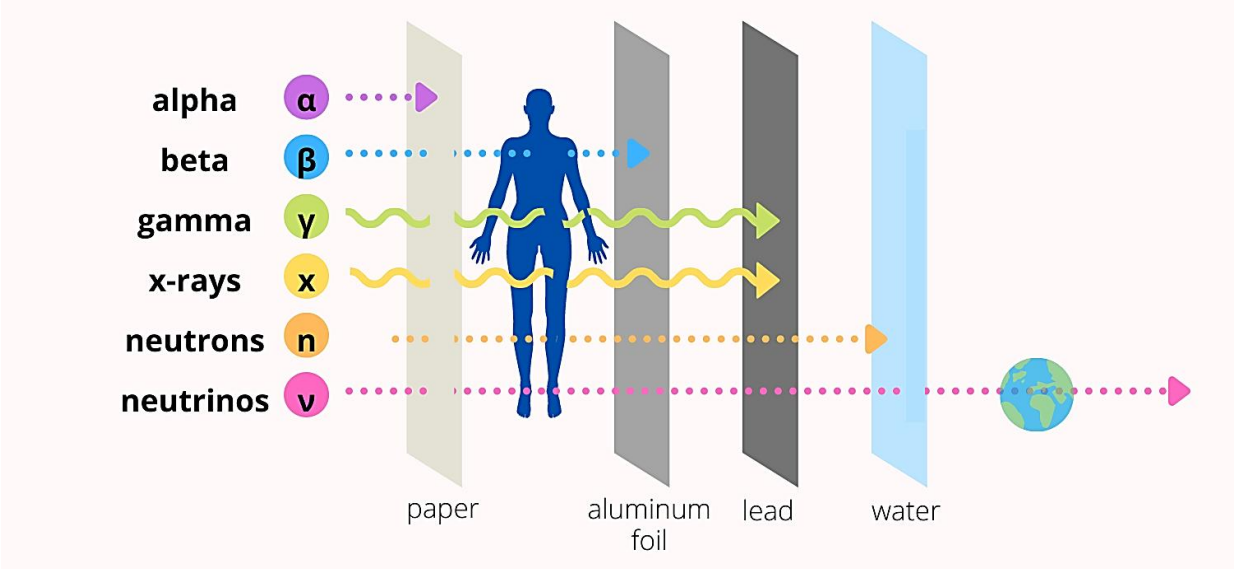

Figure 18: type of radiations and effects of human body and materials

7.3.2. Biological Detectors

Biological detection is a very complex process, it requires the collection of samples from the air or wipe sample from contaminated surface, followed by a preparation which can last several hours or more.

Even nowadays, it is technically impossible for a biological field analyser to differentiate between the very numerous non-dangerous biological agents of the environment and a pathogenic agent that would be introduced into its biological detection zone. Biological detection terminals as of today make it possible to monitor certain sensitive areas by measuring variations in biological concentrations in the air.

Air filtration systems also allow continuous analysis of pollution levels or allergens. They are generally located on the upper parts of buildings in certain urban areas but are not capable of carrying out detection measurements at ground level or covered areas.

Given the delays in obtaining confirmation of biological contamination, this step would no longer be the responsibility of the hotel but of the local authorities, particularly health authorities. Detecting a biological threat is often a matter of common sense and awareness among personnel working in security areas.

The appearance of symptoms simultaneously on several people, or the presence of sick or dead animals near the hotel, are examples of visual indications of a present risk, which do not depend on specific detection equipment.

However, in case of biological contamination, symptoms occur after a latency period, often several days, called the incubation period.

7.3.3. Chemical Detectors

There are many chemical product detection devices on the market, and they offer multiple detection and identification capabilities.

Chemical detectors should be chosen from those that meet the desired effect for security in a hotel and PID (Photo Ionization Detector) type technologies offer good response capabilities for general site monitoring showing for example the oxygen levels and the HEL (higher explosive levels) or more commonly UEL (upper explosion limit) providing already useful information on actions that should follow based on the specific information received by the PID. Such actions could be for example venting the decrease the HEL.

Figure 19: example of a photoionization detector

Many chemical detection devices are often very responsive, accurate and fast but they only detect what they were designed or programmed to. Nevertheless, this does not mean that they are always accurate. False positives[5] is unfortunately a common presence with any chemical detector. Their limitations must be perfectly known to operators. Some devices can detect gaseous products, such as those already found in the ceiling alarm boxes of hotel rooms to detect combustion gases and provide early warning of a fire. Others, placed near heating appliances, can detect deadly combustion gases, and alert the occupant, waking them from a sleep that would be fatal. However, a gas detector cannot detect a liquid even if it is particularly concentrated and dangerous.

The result given by a detection device must be correctly interpreted by its operator, who must have been trained in the use of the equipment. Their knowledge of the device and its operation must have been tested and validated via a procedure recognized by the hotel. The hotel staff doesn't need to have technical knowledge about spectra, but the instruments should include a library of compounds linked to findings, to produce easy-to-read chemical results.

It should also be noted that temperature, humidity, or wind conditions can modify, or limit, the detection capabilities of CBRN devices. Among chemical detectors, there are portable, hand-held devices, or also more complex systems for identifying chemical substances which have been previously listed and integrated into a device database.

Detectors for dangerous liquid products are often associated with an integrated heating system, which makes it possible to transform a liquid sample into a gaseous sample by raising the temperature, and thus enable its detection or identification by a gas detector.

Depending on the hotel's choices regarding its chemical detection system, multi-gas detectors may be chosen. However, these devices typically do not enable the identification of many gases that could be employed in a terrorist context. More sophisticated systems nowadays can detect and identify a wide range of chemicals such as industrial chemicals, drugs, or explosives. They are generally expensive, intended for specialized units, benefiting from specific technical training.

Choosing the right chemical detection system requires the knowledge of the different categories of chemicals. There are several ways to classify chemicals, according to their dangerousness or their effects, or whether they are lethal or incapacitating.

In the context of CBRN threats posed by a malevolent perpetrator, the classification of chemicals plays a crucial role in choosing the appropriate chemical detection system. This process ensures that the chosen system is capable of identifying and alerting responders to

5 False positive: A false positive is when the detector determines something is true when it is actually false (also called a type I error). A false positive is a “false alarm.

the presence of harmful substances effectively and in a timely manner. This is a potential classification:

1. Understanding the Nature of the Threat

- **Toxicity Classification**: Chemicals are classified based on their toxicity levels, which help determine the potential harm they can cause. For instance, some chemicals might be lethal even in small doses (e.g., nerve agents like VX or sarin), while others might be incapacitating but not necessarily fatal (e.g., tear gas). Knowing the toxicity helps in selecting detection systems sensitive enough to identify these substances at dangerous concentrations. Toxicity is highly depended on route of entry (by inhalation, by skin penetration, by digestion).
- **Persistence and Volatility**: Chemicals are also categorized by how long they remain active in an environment and how easily they disperse. Persistent agents, like mustard gas, remain hazardous for long periods, requiring detection systems that can operate over extended times and in various environments. Volatile chemicals, on the other hand, may require rapid detection in air samples.
- **Physical State (Solid, Liquid, Gas)**: The state in which a chemical is found (solid, liquid, or gas) affects how it spreads and how it should be detected. For example, gaseous chemicals might require air monitoring systems, while liquids or solids might need surface or water detection methods.

2. Targeted Detection

- **Chemical Families**: Chemicals can be classified into families based on their structure or functional groups (e.g., organophosphates, cyanides, vesicants). Detection systems are often tailored to identify specific chemical families. Understanding the perpetrator's likely choice of chemicals (e.g., organophosphates in nerve agents) enables the deployment of detection systems specifically tuned to those substances.
- **Biological Effects**: Chemicals are categorized by their biological effects, such as whether they are irritants, choking agents, or blood agents. This classification helps responders predict symptoms and effects, which in turn guides the selection of detection methods that can identify these chemicals before symptoms appear.

3. Strategic Placement of Detection Systems

- **Area Monitoring vs. Point Detection**: Depending on the classification of the threat (e.g., widespread release of a volatile agent vs. localized contamination with a persistent agent), detection systems need to be placed differently. For volatile gases, area monitoring with remote sensors might be crucial, while point detection might be more suitable for solid or liquid contaminants.

- **Speed of Detection**: Some chemicals require immediate detection due to their rapid onset of effects (e.g., nerve agents), while others might allow more time (e.g., slower-acting toxins). Understanding these classifications helps in choosing systems with appropriate response times.

4. Integration with Protective Measures

- **Compatibility with Protective Equipment**: The classification of chemicals by their impact on humans influences the type of personal protective equipment (PPE) used. Detection systems should be compatible with the PPE to ensure that the alarms or alerts can be effectively communicated to and acted upon by personnel in protective gear.
- **Response Planning**: Classification helps in formulating response strategies that integrate detection systems with decontamination and evacuation procedures. For example, the detection of a non-lethal but incapacitating agent might prioritize evacuation over decontamination, affecting the choice of detection system.

5. Legal and Ethical Considerations

- **Regulatory Compliance**: The classification of chemicals also includes their status under international treaties (e.g., Chemical Weapons Convention). Detection systems must be able to identify substances that are regulated or banned, ensuring that responses are in line with legal and ethical standards.

Classification of chemicals by their danger levels, effects, and other characteristics is essential in selecting the right chemical detection system for C(BRN) threats. It ensures that the detection system is sensitive, responsive, and strategically placed to mitigate the impact of hazardous substances effectively. By aligning detection capabilities with the specific threats posed by classified chemicals, authorities can enhance preparedness and response to potential chemical attacks or incidents.

The classification below, directly from the military field, is also found in specialized CBRN response units. Lethal chemical agents include blister, chocking, blood or cellular, and nerve type G or type A. Incapacitating agents include two subcategories: physical incapacitants and psychological incapacitants. Out of these categories are incendiary agents, pesticides and phytosanitary or phytochemical agents as well as smoke-producing agents.

While the statement acknowledges the existence of various classification methods derived from the industrial sector, it's important to recognize that the most widely accepted and standardized system for classifying and labelling chemicals in industrial and trade contexts is the Globally Harmonized System (GHS), implemented in the EU as the Classification, Labelling, and Packaging (CLP) regulation. Although many sectors, such as transportation, firefighting, and agriculture, may adopt specialized classification systems tailored to their specific needs, these often complement the GHS rather than replace it. Additionally, dual-use chemicals,

which have both legitimate industrial applications and potential use as weapons, are subject to stringent monitoring and controls under these systems to ensure their safe and responsible handling across various sectors. This integration of GHS/CLP standards with sector-specific requirements ensures a comprehensive approach to chemical safety and security.

The chemicals used to synthesize these hazardous products are called chemical precursors. They are subject to the same monitoring rules, especially if they are basic products for the synthesis of drugs and explosives, which are also chemical products, but today easily detectable with appropriate equipment.

As with biological detection, common sense, and the level of awareness of chemical risks among hotel security personnel can help detect suspicious indicators in the absence of a specific chemical detector. Unusual odours, more or less pleasant, or clouds of gas, coloured or not, must obviously attract attention and be the subject of immediate reporting and research into their origin.

The 5S methodology, originally developed for improving workplace organization and efficiency, can be effectively applied to the context of CBRN risk management, particularly in environments like hotels where security personnel must be vigilant about potential threats. Here's how the 5S principles can be adapted for CBRN procedures:

1. Sort

- **Application**: Identify and remove unnecessary items that could clutter the workspace or create confusion during an emergency. For CBRN readiness, this involves ensuring that only essential materials and equipment, such as protective gear, detection devices, and emergency kits, are readily accessible.
- **CBRN Context**: Removing non-essential items reduces the risk of accidental exposure to hazardous materials and ensures that critical tools are immediately available during a CBRN event.

2. Set in Order

- **Application**: Organize the workspace so that everything has a designated place, making it easy to find and use items quickly. For CBRN preparedness, this includes having clear, labelled storage for detection equipment, protective gear, and emergency response materials.
- **CBRN Context**: A well-organized environment helps security personnel quickly access the right tools and follow procedures efficiently, reducing response times and improving safety during a CBRN incident.

3. Shine

- **Application**: Maintain cleanliness in the workspace to prevent contamination and ensure a safe environment. Regular cleaning routines should be in place to avoid any

build-up of hazardous substances and to keep detection equipment in optimal working condition.

- **CBRN Context**: Cleanliness is critical in preventing the spread of contaminants in the event of a chemical or biological release. Regular inspections and cleaning help in identifying unusual substances that might indicate a CBRN threat.

4. Standardize

- **Application**: Develop standardized procedures for tasks and ensure everyone follows them. In the context of CBRN, this means having clear, practiced protocols for identifying, reporting, and responding to suspicious indicators such as unusual odours or gas clouds.
- **CBRN Context**: Standardized procedures ensure that all personnel are aware of and can correctly respond to potential CBRN hazards, minimizing confusion and improving coordination during an incident.

5. Sustain

- **Application**: Maintain the established standards through regular training, audits, and continuous improvement. For CBRN preparedness, this involves ongoing training for security personnel on recognizing CBRN threats and the importance of maintaining vigilance.
- **CBRN Context**: Sustaining a high level of awareness and adherence to procedures ensures that the facility remains prepared for potential CBRN incidents, with personnel who are always ready to act.

The presence of dead animals in the same place, probably indicates localized toxicity on the ground, in a shelter, in the air, or in a lake or a river nearby. The sudden change in the colour of the vegetation in or around the hotel, could be linked to the presence of a toxic product, probably chemical, in the water, the soil or in the air. This is also a detection indicator to consider for personnel who have been made aware of CBRN risks.

The appearance of similar and simultaneous symptoms on several people in the hotel must provoke an immediate reaction even in the absence of specific alarm on chemical detectors. The main symptoms of chemical attacks are often respiratory problems, with convulsions, salivation, redness of the eyes or skin. Symptoms can appear inside the hotel, in an outdoor garden, or near ventilation systems.

The dissemination of the toxic product can be carried out in the form of gas, droplets or liquid projections and the means of dispersion can be detectable because it is often visible. For a hotel, alert detection is essential, regardless of the CBRN agent.

Knowing all the characteristics of the type of danger is secondary to knowing about an immediate danger. An immediate danger allows you to move away from it and take the first emergency measures to protect people from it. It is desirable, before starting any evacuation, to confirm the alert with at least a second information. A second positive detection, coming from a device using different technology, makes the information received by the first alert, more reliable.

A good level of training and situational awareness for hotel security operators is essential before initiating an evacuation because a sensitive chemical detection system can give positive results on household products used for cleaning from the hotel, fuel products for vehicles in the establishment's parking lot, fertilizers for the gardens, insecticides, etc. Only correct interpretation and the right level of training will make it possible to have a real vision of the situation and good control of the data received by the chemical detection means. The objective of this precautionary measure is to ensure real exposure to a danger, to correctly assess the level of risk. Being able to characterize the exact origin and precise nature of the danger can take time and must be done with suitable protective equipment. It is often the tasks of specialized CBRN response units.

Confirmation of a CBRN attack and confirmation of the exact type of toxic agent used is not the responsibility of the hotel. In case of doubt, the competent authorities should always be contacted.

7.4. Protective Equipment

CBRN protective equipment, also referred to as PPEs (Personal Protective Equipment), is designed to prevent contact with toxic agents, thereby mitigating the risk of harm to the health of hotel staff and guests in the event of potential contaminated contact. PPEs come in between the CBRN agent and the possible routes of penetration into the human body.

Following the detection of CBRN contamination within the establishment, the primary response involves the hotel's immediate emergency procedures aimed at saving lives, reducing harm, and protecting people while waiting for the arrival of trained emergency services. The hotel staff should not take on the role or responsibilities of emergency services, nor delay critical actions by attempting to locate or don complex protective equipment. Instead, basic protective measures, such as the provision of FFP masks, may be considered for staff who are responsible for these initial emergency actions. However, it is essential to emphasize that these measures are only temporary, and hotel staff must understand that such equipment does not guarantee safety. The specialized emergency services, who are properly trained and equipped, will handle decontamination, detection, and medical care as per their protocols upon arrival. The information provided in this chapter is for guidance only and should not be

interpreted as a directive for hotel staff to undertake hazardous actions beyond their training or responsibilities.

In the following lines, it will be explained the four possible routes of entry of CBRN agents in the human body:

1. **Inhalation**: when breathing, toxic agents mainly in gaseous form enter the lungs, and generally cause immediate symptoms, particularly if chocking agents.
2. **Absorption of toxic substances through the skin**: although the skin is a natural protective barrier against most biological agents, many CBRN agents can pass through it, often after damaging it. Chemical agents from the blister family easily penetrate layers of clothing and then cause blisters on the skin, initially like those of burns, but they occur after a delay and without any initial pain. Nerve-type agents also pass through the skin easily and are extremely dangerous. The effects are very fast, the after-effects are significant, and they are among the most lethal agents among chemicals. Alpha and Beta radiological ionizing radiation does not pass through clothing or skin. Gamma and X radiation pass through the body and clothing without difficulty.
3. **Intracutaneous penetration**: direct penetration of the contamination into the body, either by a projectile, a sharp object, or a needle, or even an insect bite. By this method of diffusion, contaminating products in solid or liquid form can penetrate deeply into the body. Alpha but also beta radiological particles would have extremely harmful effects if they were inside a victim's body.
4. **Ingestion**: The last possibility of contamination concerns the ingestion of contaminated CBRN products. This can be done by drinking or eating contaminated food, or by smoking a cigarette in a contaminated area. Often, this contamination is absorbed by victims without them being aware of it. With this mode of contamination, the penetration of products into the body can have amplified effects. Considering the possible routes of penetration of CBRN type agents into the body, the hotel can design possible modes of protection with the equipment it wishes to acquire.

7.4.1. Personal Protective Equipment

As the hotel is not designed to function as or supplant a CBRN intervention unit, the implementation of specific protection measures is solely intended for the first aid of staff or customers who have encountered one or more forms of contamination, while waiting for emergency services. Here below there’s only some informative paragraphs about different types of PPEs, without any specific recommendations for hotels.

OSHA LEVELS	LEVEL A	LEVEL B	LEVEL C	LEVEL D
Items Worn	NIOSH approved positive pressure, full face-piece self-contained breathing apparatus (SCBA); Totally-encapsulating chemical-protective suit; Inner and outer chemical-resistant gloves; Chemical-resistant, steel toe and shank boots (Optional: Hard Hat/Helmet, Coveralls, Long Underwear, Outer Disposable Suit/Gloves/Boots or Flash Suit; PAPR/SCBA Hybrid System).	NIOSH approved positive pressure, full face-piece self-contained breathing apparatus (SCBA); Hooded chemical-resistant suit (one or two piece); Inner and outer chemical-resistant gloves; Chemical-resistant, steel toe and shank boots or chemical resistant boot covers (Optional: Hard Hat/Helmet, Coveralls, Face Shield; PAPR/SCBA Hybrid System).	NIOSH approved full face or half mask air purifying respirator; Hooded chemical-resistant suit (one or two piece); Inner and outer chemical resistant gloves; Chemical-resistant, steel toe and shank boots or chemical resistant boot covers (Optional: Hard Hat/Helmet, Coveralls, Face Shield).	Coveralls or other work clothing; chemically resistant steel toe and shank boots/shoes or chemically resistant boot covers (Optional: Gloves; Safety glasses or chemical splash goggles; Hard Hat/Helmet; Escape Mask; Face Shield).
Used For	Unknown environments; Confined spaces; Environments requiring the greatest level of skin, respiratory, and eye protection	The highest level of respiratory protection is required, but a lessor level of skin protection	The concentration(s) and type(s) of airborne substance(s) are known and the criteria for APR are met according to NIOSH or equivalent guidelines	Atmosphere contains no known hazard and where work conditions preclude spalahses, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of chemicals

Figure 20: different levels of CBRN PPE

Respiratory protections can be provided as PPEs are intended only to escape more safely and could integrate a CBRN filter (anyway, the recommendation is still to escape the quickliest rather than losing time in order to find PPEs). The characteristics of the filter should be known before any use. CBRN emergency hoods provide good protection, but only respiratory and full facial protection, hence eye protection as well, for a limited period but sufficient to leave or cross a contaminated area. CBRN emergency hoods meet specific CBRN certification standards. CBRN emergency hoods do not need to be adapted to the shape of the wearer's face because they are one size. A smaller model, intended for children, is available from certain manufacturers. They have the advantage of being easy to use and are always single use. The storage and conservation of the emergency hoods during their validity period do not require any maintenance operation. It should be noted that this type of equipment can equip, when they exist, the VIP areas of the hotel in the event of an CBRN attack.

However, protection is only respiratory and in case of CBRN risks only. In the event of a fire, wearing this type of protection does not compensate for the lack of oxygen, nor is it fire

resistant. Below 17% oxygen concentration of the inspired air, it becomes difficult to breathe. No respiratory protection filter system should therefore be used below 17% oxygen in the ambient air. As its name suggests, a filter will stop certain chemical molecules corresponding to its specific characteristics but cannot increase the oxygen concentration in the air in sufficient quantity. The normal oxygen content of the normal environment is between 19 and 21%. From an oxygen level below 17%, the chances of human survival are very limited.

Faced with a radiological risk, the evacuation filter hood prevents the penetration of radioactive particles into the respiratory tract. This protection is very important, particularly against the dangerous nature of particles emitting Alpha and Beta radiation inside the human body. Evacuation hoods offer no protection against remote irradiation caused by a radioactive source. These concepts must be taught and perfectly understood in the CBRN training set up for the implementation of the protective equipment made available by the hotel.

Respiratory protection masks FFP (Filtering Facepiece Particles), if they are at least FFP2 type, offer good protection capabilities against radiological and biological particles. FFP1 type masks stop at least 78% of aerosol particles with an average diameter of 1.5 microns. For FFP2 and FF3 masks this capacity is 92% and 98%. For particles of 1 micron, which are the most dangerous in airborne contamination, FFP2 and FFP3 masks offer filtration efficiency of 99.8% and 99.9%. For FFP3 masks, which are, in terms of breathing, the most restrictive to wear because they have greater resistance to the passage of air, the optional presence of an exhalation valve can make wearing them more comfortable. FFP2 and FFP3 masks can thus be a good economic and operational compromise, for respiratory protection implemented preventively in a hotel. FFP3 is surely the best option but with an high cost, FFP2 is a good compromise between efficacity and costs.

Figure 21: different types of FFP masks

In a broader CBRN context, it must nevertheless be taken into account that these masks do not filter chemical agents and do not offer protection against irradiation caused by ionizing

radiation from radioactive particles. FFP masks maintain their effectiveness for approximately 8 hours but the manufacturers who sell them guarantee their effectiveness for periods of only 3 or 4 hours. Surgical masks are not affected by the FFP classification and have an insufficient level of respiratory safety in a CBRN framework. Surgical masks are intended only for sick people in hospitals, to limit the aerosolization of their secretions.

Concerning a potential radiological event, the general principle of protection against radiological situations can be summarized and made up of three notions: Time – Distance – Shielding.

- It involves a person staying as short as possible next to the radioactive source to avoid accumulating the doses received per unit of time.
- By staying as far away as possible from a radioactive source, when it can be precisely located, the radioactive dose received by a person can be reduced.
- By remaining sheltered behind an obstacle or a shield, in relation to the position of the radioactive source, the radioactive dose received by a person who is in an irradiating zone, can also be reduced.

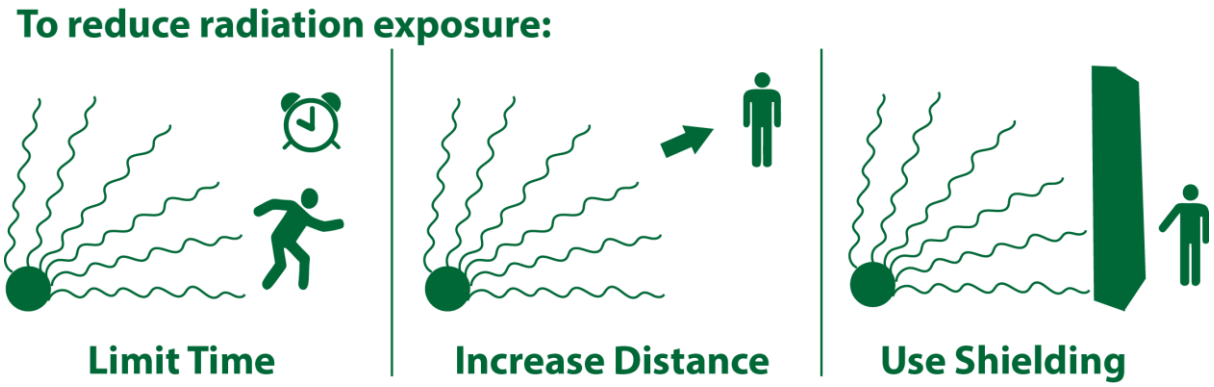

Figure 22: Time - Distance - Shielding approach in radiation protection

These obstacles or shield have different protection level against radiation, depending on their characteristics of thickness, density or material, and depending on the type of radiation absorbed. A simple sheet of paper is enough to stop Alpha radiation while a thick lead screen is necessary to reduce Gamma radiation.

Sheltering in place procedure

General rules

IF no escape from an imminent/expected CBRN hazard THEN consider sheltering in place

IF it is deemed unsafe to evacuate THEN the following procedure should be followed:

1. consult with the person in charge for a sheltering option and exchange all necessary information (type of incident, hazard, the general security situation, the congestion of the evacuation)
2. gather and count all those needing to be sheltered together and inform them of the decision to shelter in place.

IF the premises is equipped with positive ventilation and approved as the shelter by the person in charge THEN move to the designated shelter, close the door once everyone is inside;

OR

IF there is no safe supply of air to the premises THEN

SIP Procedure

1. move to the designated shelter and close the door once everyone is inside.
2. close all doors and windows, seal tight the openings with available means, and lock and secure the building as far as possible.
3. turn off any air conditioning or ventilation fans, etc.
4. seal the overlapping material lining the door with that lining the wall using duct tape.
5. place damp towels at the bottom of the door to reduce the air entering under the door.
6. anyone showing any signs of exposure to CBRN agents should immediately remove all clothing, wash using soap and water, dry themselves with a towel, and put on clean clothing; then seal the clothing, using wipe cloths and towel in the heavy-duty plastic bags using the duct tape; cover any cuts or breaks in the skin with adhesive wound dressings.
7. contact the person in charge or the pre-arranged contact person (as per the agreed communication procedure) and inform them that [specify number] of persons are sheltering in place.
8. await further instructions (as per the agreed communication procedure). Never eat, drink or smoke whilst sheltering in place. Avoid contact between hands and face to minimize the possibility of inadvertent intake of CBRN agents.

SIP guidance

A. Location of the shelter

Wherever possible the shelter satisfying the above-defined requirements should be located:

1. above ground level but not on the roof (note that the shelter should never be located in a basement as many CBRN agents are heavier than air and tend to concentrate in basements and cellars).

2. in the centre of the building, ideally with no windows or as few (well-fitting) windows as possible.
3. in a room with substantially constructed walls and a well-fitting, preferably lockable door.

B. Shelter conditions

Can be sealed tight from the outside, including sealing-tight doors openings, windows, intake and exhaust ventilation}

AND

Cubic dimensions of premises selected for SIP are large enough to satisfy that the amount of air is not less than 4.3 [l/person/min] otherwise damages due to CO_2 poisoning outweigh any sheltering benefits. The number is average-based; a significant percentage of adult men or children will alter the calculations.

OR

Premises selected for SIP are equipped with external positive pressure ventilation with air intake known to be safe from CBRN emission hazard

When to STOP SIP

Sheltering in place is a temporary measure to reduce the potential for exposure to harmful levels of CBRN agents. Without specialist collective protection facilities, the time for which sheltering in place can be maintained is limited. This is because:

1. no improvised shelters can keep out all contamination – after a period of two hours, the concentration of contamination inside the shelter is likely to equal or exceed that outside the shelter.
2. as the exchange of air with the outside is restricted, levels of exhaled carbon dioxide may exceed safe levels inside the shelter after a period of a few hours. Sheltering in place should therefore be limited to two hours unless extreme circumstances prevail (for example, an ongoing bombardment by CBRN munitions, which make the risk of leaving the shelter greater than those of remaining within it).

Before leaving the shelter, every effort should be made to determine whether it is safe to do so. Whilst it is difficult to do this accurately without detection and monitoring equipment, some indicators that the concentration of agent has fallen below levels immediately dangerous to life and health may include the following:

1. an evacuation request from the person in charge.
2. released congestion on the evacuation routes.

Regarding contamination by biological agents, careful washing with soapy water of hands and areas of the body not covered by clothing, is often sufficiently effective against most viruses and bacteria. Alcohol is an effective biological decontaminant, in particular against viruses. Hydroalcoholic gel solutions contain alcohol, which is the decontaminant.

Hydroalcoholic gel solutions have proven their effectiveness during the recent SARS-COV 2 pandemic. During Covid-19 pandemic, the widespread use on hand disinfection solution, on a large scale in the population, has led to a significant reduction in many seasonal diseases caused by natural biological agents.

Bleach is used very frequently for various industrial or household cleanings, or even disinfection. Its properties can be used in area contaminated by biological agents, or suspected to be the cause of biological contamination, to neutralize potential biological risks.

In case of an intentionally provoked situation, however, the potential evidence for investigators from the police or health authorities do not be destroyed or damaged. By carrying out biological decontamination of the premises, before taking samples for laboratory analysis and identification, there is a high risk of destroying clues for the ongoing investigation.

Also note that the chlorine contained in bleach has the capacity to neutralize some dangerous chemical agents as well. Bleach can therefore be used to decontaminate areas in chemical environment. However, bleach, like any other chemical or biological decontamination solution, has no effect on radiological contamination.

Bleach should never be used pure, or highly concentrated, on skin or on wounds, or in the eyes as it could cause burns and serious lesions.

7.5. Emergency planning

In the event of a CBRN situation or suspicion thereof, triggered by an alert from the hotel's detection system, and following the 5S, an established and tested emergency procedure must be implemented.

A CBRN emergency plan specific to each establishment and including all the characteristics of the hotel is essential. Once the alert is considered sufficiently serious or credible, often following two concordant information, a coordinated evacuation decision is made, for both customers and hotel staff, to the exits and into the open air, or to safe areas, following routes away from the source of the danger.

The alert must be immediately transmitted to the competent authorities to request their response with specialized teams. Continuous communication with authorities is upheld throughout the unfolding situation to relay any new developments until the arrival of emergency services on-site.

Emergency decontamination operations, as the aforementioned REMOVE, REMOVE, REMOVE is conducted taking into account the prevailing circumstances, the suspected level of risk, and the potential method of contamination. Actions to remove outer layers of clothing should be managed by all people who have been potentially in contact with CBRN agents. Other actions, as rinsing parts of the body covered by clothing with soap and water could be good precautious measures, but since the CBRN is unknown, this and further actions are discouraged. The REMOVE x3 procedure is still the best recommendation while waiting the intervention of specialized personnel.

Please note that if the mode of contamination is only in gaseous form, therefore without solid or liquid particles deposited on the victims, then undressing the upper layers of clothing followed by rinsing with soapy water is not necessary. However, at the initial stage of the alert in the hotel, it is impossible to have this technical information. In this situation, measures of removing the upper layers of clothing, (the REMOVE x3 procedure) would have no negative effect and can therefore be carried out without restriction. They would help to reassure the victims while preventing them from dispersing within the hotel or outside the hotel, by keeping them occupied until specialized and medical units arrive.

It is necessary, as far as possible, to prevent guests supposed to be contaminated from leaving the hotel, trying to go and using various means of transport to a medical care facility. This action would have the effect of further dispersing the possible CBRN contamination outside the hotel. It could contaminate new victims who cross the route of the contaminated hotel guest. Moreover, if the medical care facility receiving the hotel guest is not promptly informed of the ongoing CBRN situation, there is a risk of contamination within the facility while tending to the victim from the hotel. This risk persists if the victim's upper layers of clothing are not promptly removed and their body rinsed before entering the medical facility.

Good early communications will be essential for keeping affected people on-site and well-informed about how their medical and welfare needs will be met. Implementing immediate emergency decontamination procedures and updating them about the specialised medical support coming to their assistance will positively influence their decision to cooperate with remaining at the scene. Key public messages about how to stay safe during a CBRN emergency should be carefully prepared in advance so they can be quickly communicated to people. It must be considered that customers' clothing is likely to carry CBRN contamination. As soon as cloths are removed, they should (only if possible) be placed in closed bags to avoid any dispersion of the CBRN contamination. The shoes of contaminated people, and especially the soles of shoes, are often the potentially most contaminated items. Because of gravity, CBRN particles fall to the ground and people, when moving through a contaminated area, involuntarily collect these particles on the soles of their shoes. Shoes are therefore part of the upper layers of clothing that must be removed from contaminated people.

Depending on the case, water that has been used for washing hands or faces, as well as for showers, is also likely to be contaminated and should not be reused for another person. Guests

who have not been exposed to the contamination within the hotel premises should be promptly directed to open-air locations and gathered together, removed from the hazardous area. They are to remain in this designated area and refrain from leaving until the arrival of response units. Specialized emergency services will verify their actual absence of contamination.

All individuals, including those unaffected by the incident, should be encouraged to remain on-site for the authorities' investigation. This measure aims to identify potential future victims in case of delayed symptom onset and to facilitate the potential identification of the perpetrator, who may still be present among the individuals. People in the hotel who have not been in the contamination zone, must not be in contact with people who are likely to be contaminated, to avoid any transfer of contamination between them.

The distribution of FFP respiratory protection masks must be carried out indiscriminately, as soon as possible, for hotel staff and customers, whether they are considered contaminated or not.

If the contamination appears to be of a chemical nature, considering the symptoms of suffocation for example, CBRN emergency evacuation hoods should be immediately distributed, and people head towards exits or decontamination operation area and emergency procedures will be applied.

All these specific actions to be taken must be described in the emergency plan of the hotel. These actions must be known and understood by the staff and repeated during practical exercises.

The hotel's emergency plan, which consider potential CBRN situations, must be updated regularly. It must be improved, if necessary, especially when the carried-out exercises show difficulties in implementation or inadequacies with the structure or operation of the hotel. The CBRN emergency plan includes all evacuation or containment procedures, in specific circumstances that the personnel in charge of this action must perfectly master. The procedure for alerting the authorities must be detailed, with for example, standard report models including all the information to be collected and transmitted.

Communication protocols must be known and strictly followed by hotel staff. Methods for reducing stress in emergency situations should be taught and regularly reminded to hotel staff who may be part of this phase.

Situations that need specific attention must be identified and anticipated, such as the care of elderly and dependent people, children unaccompanied by parents, specific medical or physical situations, people under heavy medical treatment, pregnant women, people with severe disabilities. The presence of foreign guests in an international hotel can also generate comprehension problems due to language barriers. Some hotel guests may be accompanied by their pets, and hotel staff should take this into account when conducting emergency evacuation or decontamination of the guest.

Secure assembly areas outside the hotel in the event of an CBRN situation can be similar with those that would be used in the event of another type of alert, such as a fire.

In the event of a CBRN situation, given the potential movement of contamination in the direction of the wind, this variable and unpredictable factor must be taken into account when determining evacuation and regrouping areas for hotel guests. The same applies to the hotel's ventilation or air conditioning systems, as well as the layout of elevators, which could facilitate the movement of contamination towards the secure area initially selected by the hotel.

Customer evacuation distances must be defined according to each situation, but evacuation should be always in the opposite wind direction in relation to the contaminated area. Alarm systems to trigger evacuation in case of a fire, should not be the same as a CBRN event: CBRN evacuation must have different alarm sound. If customers require emergency medical care in addition to the contamination, it is recommended to gather them together, in a dedicated area, neither accessible nor visible to other guests.

The presence of a nurse, or a first aider, trained in emergency care in CBRN contaminated environments, is desirable. The emergency plan must unambiguously designate the department responsible for coordinating all actions and ensuring that they are carried out in accordance with the directives validated by the hotel. The psychological impact on customers must not be underestimated. Depending on the culture or religion of the clients, the operations of removing the upper layers of clothing may be difficult to accept. Adaptations on a case-by-case basis and depending on the circumstances will have to be found, in the most intelligent way possible. It is important for people to whom respiratory protection means have been distributed, that they use them until specialized units arrives. It is important to avoid any further spread of contamination, even if people believe they are out of danger. Radioactive contamination, for example, does not provoke any physical sign of its presence if no appropriate detectors and the same goes for biological contamination. Respiratory protection helps prevent contamination from entering the body of people.

To improve and optimize a hotel's CBRN emergency plan, it is always useful to establish contacts with other hotels from the same company or in the same geographic area, to share plans and documents already drafted or validated. Threats and CBRN incidents, and how they were managed could also be shared. Assistance protocols can be signed, with other hotels or with local authorities.

These protocols are tested during CBRN exercises and training sessions regularly organized by the hotel.

7.6. CBRN annex to an emergency plan

When a hotel has already devised an emergency plan to address exceptional circumstances it may encounter, such as fires, tsunamis, earthquakes, floods, and so forth, which encompasses procedures for evacuating individuals, alerting local authorities, reporting to personnel responsible for hotel security, communicating with customers, and attending to victims, the necessity for a distinct, comprehensive emergency plan specifically tailored to CBRN situations may be obviated.

It is recommended to prepare a CBRN annex that contains all the necessary CBRN specific guidelines, procedures, maps and information in one place for quick and easy reference ready to be used in a CBRN emergency. This includes site specific plans/maps for CBRN evacuations, options for SIP, assembly areas, RVPs for emergency services and any places designated as possible triage, medical treatment or mass decontamination areas agreed in advance with the emergency services. Guidelines and checklists from this handbook can be adapted and used to create a CBRN emergency plan/annex. The annex should include the specific characteristics of CBRN incidents or emergencies that may occur. All the detection equipment that has been installed in the hotel must be described, with their locations and their detection capacity.

The categories of personnel authorized to use the detection equipment and to interpret the alarms received by the detection devices must be clearly listed and designated. The people in charge for validating the information received in the event of an alert and authorized to trigger the CBRN evacuation procedure (different from fire evacuation) of the hotel and alert the response services, are also listed, and accredited for this action.

The marshalling areas are identified as well as the evacuation routes to reach them. In the case of a CBRN event, people must always be evacuated in the opposite direction of the wind in relation to the source of contamination and considering the existing ventilation and air conditioning systems in the hotel, if they are still running. The following questions must be answered in the CBRN annex of the hotel emergency plan. The conditions for distributing CBRN protective equipment must be clearly established, and specify when to distribute it, for what type of event, on the decision of which department, how to distribute it as a priority and finally who must wear it. Emergency decontamination procedures must be detailed.

It is important to set clear roles and responsibilities as well as the flow of actions. This could be covered by emergency plan, indicating:

- Who will take the decisions of wearing PPEs,(simple masks as FFP1-2-3).
- Which services are initiating the process.
- What actions are taken or initiated and by whom.
- How are contaminated effects collected and how are they recorded.

- If a hotel possess decontamination kits - those kit contain bags and armband with same labels which could be used for future bags identification. Those kits (including labelling) are operated by the decontaminated person.
- What CBRN decontamination or disinfection products are available in the hotel in the event of an emergency and what should they be used for.
- What actions should be taken to avoid cross contamination between people who are already contaminated, with people considered not to be contaminated.
- What external areas could a hotel prepare for evacuation in case of CBRN incident taking into consideration:
    - ease of access for guests and for emergency services,
    - space big enough and resources (water source, waste collection if possible) for emergency services to conduct decontamination or medical actions,
    - primary and secondary evacuation place depending on wind direction.

Among the actions specific to a CBRN situation, and not necessarily encompassed within a hotel's conventional emergency plan, are the measures pertaining to ventilation and air conditioning systems. It has been noted, in fact, that in some hotels these areas are either easily accessible or, where located on roofs, entrances are not secured sufficiently (i.e. door unlocked, neighbouring houses with direct access to the roof and no fences). To avoid any dispersion of contamination in the different parts of the hotel, all equipment that would facilitate the movement of contaminated air masses must be stopped, which also includes elevators. To limit air movement as much as possible, doors and windows must be closed.

If containment measures have been taken, due to the immediate impossibility of evacuation without risk, all possible air inlets from the room used to confine people must be sealed with, for example, adhesive tape, plastic expanding foam, or a wet cloth. If waiting areas are in the open air, their location must be compatible with the wind direction, and it must be checked that there is no change in wind direction during the entire waiting time.

STEPS 123+ PROCEDURE

This procedure assumes no other CBRN training, knowledge or access to CBRN personal protective equipment (PPE). If first responders have any PPE on hand, it should be used in accordance with any training provided and the manufacturer’s instructions.

STEP 1 One person incapacitated with no obvious reason: you can approach with caution using standard protocols, while still putting your safety first:

CONSIDER the presence of hazard materials as one possibility (among many) that can cause a medical emergency

STEP 2 Two people incapacitated with no obvious reason: approach with caution using standard protocols, while still putting your safety first:

SUSPECT the presence of hazardous materials by actively applying x5S to make sure it is safe to approach and REPORT the situation

STEP 3 Three or more people in close proximity, incapacitated with no obvious reason: DO NOT PROCEED any closer, putting your safety first:

ASSUME the presence of hazardous materials, actively apply x5S and REPORT the situation

The first thing to consider after the presence of hazardous materials is suspected or confirmed at the scene, is for staff to remember to prioritize their personal safety so they can do their job without becoming a casualty. They must use caution and keep a safe distance to avoid exposing themselves and by avoiding unnecessary contact with people and surfaces that may have been contaminated.

If unprotected responders observe incapacitated casualties for no explainable reason – they must not proceed any closer to avoid becoming a further casualty themselves. They should consider opportunities to understand what has happened or is still happening and report this back to their supervisor, control room or person in charge. Unprotected responders can still assist without committing themselves into a contaminated area – like communicating appropriate advice from a safe distance (such as implementing the REMOVE procedure).

Hotel security and staff should not put themselves or anyone else in danger to assess the situation. IF THEY SUSPECT the presence/involvement of CBRN/hazardous materials they should inform colleagues and give their reason so the person in charge can decide what action to take.

REMOVE REMOVE REMOVE PROCEDURE

1. REMOVE: affected individuals from the immediate area…

ADVISE affected individuals to REMOVE themselves from the immediate area

- fresh air is important
- if the substance is airborne, they should head uphill as well as into the wind if possible
- if safe to do so, bring others who may be affected
- if skin is itchy or painful, they must urgently find a water source

REASSURE

- leaving the immediate area will avoid further exposure to any material in the air

• if skin is itchy or painful, lots of water is essential for fast treatment and reducing harm

REMEMBER

• you may need to shout or direct from a safe distance to avoid exposure yourself

• you will likely have to improvise and think on your feet

• remain alert - incidents involving a hazardous substance can change very quickly

• continue to REPORT: 112/supervisor/control room

• the emergency services are expected to attend the scene if the victim is still at the

2. REMOVE: outer clothing…

ADVISE

• REMOVE outer clothing if it has been affected by the substance

• try to avoid pulling clothing over the head if possible

• do not attempt to remove clothing stuck to the skin

• do not smoke, eat or drink

• once this has been done, to move away from the discarded clothing

REASSURE

• removal of outer clothing reduces the risk of further exposure by up to 80%

• if clothing has stuck to the skin, trying to pull it off risks further harm. Removal should be done by a medical professional as soon as it is practical and safe to do so

REMEMBER

• you will likely have to improvise, and think on your feet

• stay aware to any changes in situation – incidents involving a hazardous substance can change fast

3. REMOVE: the substance from the skin…

ADVISE: Is the skin painful or itchy?

NO:

• REMOVE the substance using a DRY absorbent material to soak it up or brush it off

YES:

• RINSE the affected area with lots of water

• use ANY available water source to rinse the affected part of the body

• apply water continuously until medical personnel advise you to stop

• try to avoid the water running onto unaffected parts of the body

REASSURE

• the actions taken for the symptoms give the best chance of reducing harm

• the casualty should not leave the scene as they may suffer delayed symptoms or still have a small amount

of hazardous material on them which could present an on-going risk of being spread to others

REMEMBER

• remain aware of new or worsening signs & symptoms in casualties and others in the vicinity, including responders

It should be recognised that CBRN emergencies require specific arrangements for evacuation that are very different to a fire evacuation to prevent further contamination and harm to people and property by the spread of contamination. The guidelines for evacuation and lockdown/sheltering should be included in the CBRN Annex together with site-specific plans setting out different options for evacuation routes that will keep affected an unaffected people separate throughout the process (see Annex A).

Evacuation plans should be based on the following principles:

- **IMPLEMENTING** - Remove Remove Remove if people are potentially contaminated
- **MOVING** - people to an UNAFFECTED area, using UNAFFECTED routes
- **KEEPING** - potentially EXPOSED people SEPARATE from UNEXPOSED
- **PREVENTING** - non-essential access to affected locations

Evacuation plans should consider:

- How a mixed approach of evacuation and shelter may be the most appropriate option(s) to keep people safe.

- How to implement the REMOVE x3 procedure for groups that have been contaminated.
- The best option(s) to evacuate people away from the contaminated area(s) without a risk of further contamination.
- How to keep contaminated and non-contaminated people separate during evacuation and/or sheltering.
- Access to a water supply for improvised decontamination if needed (and that it may result in contaminated waste).
- Which pre-planned messages/instructions to broadcast.
- Informing the Emergency Services about the implemented routes/sheltering to coordinate the best choices for locations of the Rendez-Vous Point (RVP), Forward Command Post (FCP), decontamination, triage-treatment points, traffic management etc.

7.7. Emergency decontamination procedures

The emergency decontamination phase concurrently facilitates the administration of first aid to individuals in need. This doesn't mean that the hotel staff has a direct responsibility or that it's on their duty to perform these activities, as emergency services will take care of it, as they will designate an area for emergency decontamination with its boundaries prominently marked for visibility by all. Access to this area should be restricted to individuals wearing CBRN protective clothing and those confirmed to be contaminated, excluding those not requiring decontamination. Separate male/female undressing areas may need to be set up. Special cases like pregnant women, children without their parents, dependent elderly people, people under medical treatment, people with pets, or people who do not understand what is being asked of them, must be subject to a special attention from hotel staff trained in stressful situations. This action should be performed while hotel staff maintains a proper and safe distance from potential victims in order to avoid cross-contamination.

Emergency decontamination procedures, to be carried out by the hotel while awaiting the arrival of specialized emergency services, are intended to limit the consequences of contamination on people. These procedures are exclusive to individuals and should not be conducted on equipment, infrastructure, or the surrounding environment. No emergency decontamination action should be carried out on the premises before the arrival of the police investigating services or health authorities. Early decontamination of the premises by hotel staff would lead to the distortion of the samples which will be taken by specialized services for laboratory analysis to identify the CBRN agents involved.

7.7.1. Emergency decontamination during radiological contamination

In the event of contamination by radioactive dust, undressing followed by a shower with soapy water allows this type of contamination to be removed almost completely.

A focus on hair and beard washing is important, as particles tend to cling to them. Respiratory protection is important to prevent particles from entering the body, through inhalation. Holding the breath while washing the hair and beard is desirable.

If hotel staff facilitate emergency decontamination operations for contaminated guests, they must first have worn CBRN protective suits so as not to be cross contaminated by simple contact. The clothing of contaminated people certainly carries the CBRN contamination. These clothes, after undressing, must therefore be placed in closed bags and identified with the name of the owner. Personal items such as watches, cell phones or jewellery must also be isolated as they are likely to be contaminated. They will be returned to their owner after advice from specialist emergency services regarding their absence of contamination and danger.

In the event of physical or bodily injuries, simultaneous with contamination, such as haemorrhages or fractures, emergency first aid treatment can be immediately undertaken. Contamination by radiological particles is never a priority over medical emergency procedures. In the case of exposure exclusively by irradiation of radioactive particles, neither undressing nor showering will be effective, because the radiation is likely to have already caused its effect inside the body it has passed through.

If hotel staff care for irradiated patients, they do not need to be protected because irradiation is not transmitted from one person to another.

7.7.2. Emergency decontamination during biological contamination

In the event of contamination by substances suspected of being biological agents such as viruses, bacteria, or toxins, wash your hands with soapy water or hydroalcoholic solution. Bleach with 0.5% concentration in chlorine is an effective dosage on most biological agents and even on certain chemical agents and could be used for items or surface decontamination.

Undressing the upper layers of clothing followed by a shower is always possible, especially if liquid or powder splashes have occurred on parts of the body other than the hands. Attention should be paid to avoid using overly concentrated decontamination solutions containing active products, excessively hot water, or applying excessive friction during washing, as these actions may result in skin lesions, compromising its natural barrier against biological agents.

Decontamination solutions should never be applied, in any case neither to a wound or in the eyes, especially those that are concentrated bleach based.

Respiratory protection is essential to prevent any penetration of CBRN agents into the respiratory tract, which would then make them much less accessible to subsequent medical decontamination processes. A decontamination solution should never be swallowed as this would only have the effect of damaging the digestive and respiratory tract, worsening the victim's initial situation. If hotel staff facilitate emergency decontamination operations for customers contaminated with biological agents, they must first have worn protective gear, mainly respiratory, so as not to breathe biological particles suspended by the air's movements of people.

The clothing of biologically contaminated people can retain biological agents in powder or droplet form. Removed clothing that is contaminated or likely to be contaminated must be placed in closed bags and identified with the name of the owner and marked as biohazard. Personal items such as watches, cell phones or jewellery must also be isolated as they are likely to be contaminated. They will be returned to their owner after advice from specialist emergency services regarding their absence of contamination and danger.

In the event of a simultaneous injury such as haemorrhages, emergency first aid treatment should be undertaken immediately. In the biological domain, it must be remembered that symptoms of illness often appear several days after initial contamination and that a person is not contagious until they show symptoms of illness.

7.7.3. Emergency decontamination during chemical contamination

In the context of a real or suspected chemical attack, emergency decontamination follows the same rules of undressing the outer layers of clothing followed by an initial wash with soapy water. The respiratory protection provided by FFP paper masks is not sufficient in the face of chemical attack, because this type of contamination does not appear in the form of particles which could be stopped by a paper filter. A specific filter against chemical contamination, such as that provided by emergency evacuation hoods, is necessary to cross an area contaminated by chemical agents, to reach the emergency decontamination zone.

Emergency escape hoods are not intended to be worn after emergency decontamination operations, which will be carried out in the open air and opposite the wind direction from the source chemical hazard. Like contaminated clothing, these hoods are considered contaminated after use and must be placed in the same closed bags as those of the victims' clothing.

Water used for washing people is considered contaminated and should not be reused. If the hotel has its own wastewater collection tanks, these must be isolated from the collective drainage network pending a decision from the specialized services.

If the mode of dispersion of chemical contamination is only in the form of gas, neither undressing nor showering is essential, as the gases do not attach to the skin, hair, or clothing. However, in the event of aerosolization of the chemical product, undressing and washing are necessary as for any other form of contaminating product.

Given the impossibility in the first moments of knowing the nature and exact type of contamination, the maximum precautionary procedure will be applied, i.e. undressing the outer layers of clothing, and rinsing with soapy water potential victims. If chemical decontamination kits have been included in the hotel's response system, they should be immediately used on the first contaminated victims. It is urgent to react in the very first moments, and before the chemicals have time to enter the body through the skin or eyes. The use of emergency chemical decontamination kits must be continued, and they must remain in place, even if the sensation of pain ceases for the victim, until the arrival of specialized help for complete medical care. Particular attention must be paid to the expiry dates of these products when checking hotel security devices.

When faced with liquid chemical contamination on the skin, any product or adsorbent material can be used to prevent the toxic chemical from passing through the skin. A simple adsorbent paper but also any powdery substance (sugar, flour, etc.) can retain some liquid. This artisanal method is effective and can be used urgently just before undressing and showering, but it has to be underlined that the chemical product retains all its toxicity and that its toxic properties have not been neutralized during its adsorption. The residues are therefore toxic and must be treated as hazardous waste.

Conversely, emergency chemical decontamination kits absorb the liquid product and neutralize it, or at a minimum prevent any further release into the environment.

In the event of injury occurring simultaneously with chemical contamination, such as haemorrhages or fracture, and if survival care must be provided, decontamination is a priority. Haemorrhagic compression of a wound contaminated by a chemical agent would have the effect of contaminating the caregiver's hand if he did not take the precaution of putting on a glove or placing a clean cloth between his hand and the wound. This action could also facilitate the penetration of chemical contamination, potentially fatal depending on the type of chemical agent, into the victim's body.

In the specific case of chemical contamination, emergency decontamination must therefore be carried out before first aid actions.

7.8. Collaboration with authorities

In case of CBRN incident, the hotel's collaboration with local authorities is more than a legal obligation.

This collaboration is an essential prerequisite for having a coordinated response, which will save time, optimize the resources employed by the hotel but also by specialized emergency services, probably limit the health consequences for people, but also the environmental damage including the immediate and longer-term impacts on hotel infrastructure. Coordination from the outset also enhances the resumption of business and activities for the facility, following the completion of all control and verification measures confirming the absence of contamination and hazards to the public The resumption of the economic functioning of the establishment is a significant asset for the hotel after a CBRN event.

Collaboration between the hotel and the competent local authorities start from the drafting of emergency and intervention plans, considering the opinions of the specialized units which would be required to response on the site in case of CBRN event. Specialized services can offer their support when assessing the needs for CBRN detection and protection equipment, possibly searching for the most efficient or most suitable equipment, or which is compatible with the equipment used by local emergency services. Regular meetings can take place between all services, private and public, concerned by the hotel's CBRN security measures. The participation of local and specialized emergency services in CBRN exercises organized by the hotel to train its staff, is desirable and must be proposed. Local agreements and conventions can be signed, to prepare and improve coordination measures, in the event of a real contamination situation with CBRN agents.

Communication protocols can be established, and contacts and liaison officers can be designated from both sides, to enhance connection and coordinate any future action in the event of CBRN incidents. The objectives and constraints of each side should be mutually presented to be perfectly understood. The drafting of alert sheets can be carried out jointly. Or it can be prepared by the hotel and proposed to the local authorities for evaluation and advice. These sheets must include all the essential space/time/information/… sections, to be transmitted to the authorities in the event of an CBRN incident.

The frequency of meetings may vary depending on the stakeholders and local needs or depending on new elements to be considered, including if new people are promoted to positions linked to the implementation of CBRN emergency plans.

Guidelines for interoperability with the emergency services:

Advance consultation and joint planning/plans between the emergency services and the hotel/conference centre is good practice to ensure a timely and effective response by the emergency services and hotel/conference centre in case a terrorist/extremist threat or attack was to ever occur.

The best pre-determined options and locations for emergency activities should be selected, agreed and included in plans held by the emergency services and the hotel/conference centre, examples include:

- Forward command post(s) - for a representative from the hotel/conference centre to attend and provide cooperation, support and coordination of the response.
- Rendezvous Point(s) for emergency services - for their resources to assemble close to the scene and for briefings of their staff so they can be deployed.
- Triage and treatment areas - for emergency medical services to establish their medical responses for processing casualties and transport them to medical facilities for further treatment if necessary.
- Mass decontamination area(s) - for large scale decontamination of people if needed as a result of a CBRN incident/attack.
- Traffic Management plan(s) - to ensure speed of access to the site/event for emergency vehicles and implementation of road-blocks/diversions to keep people and traffic safely away from the area, to deal with potential points of congestion that may impede their response and ensuring ambulances can leave the area to transport casualties to hospital.

The hotel/conference centre should:

- **Design** specific emergency procedures to complement and facilitate the emergency services' response plans into their own plans (such as closing car parks and keeping access roads/points clear so as will not to block emergency service access and/or surrounding road networks).
- **Share** their emergency plans and procedures with the emergency services so evacuation/invacuation/lockdown plans and routes are known together with any designated protected/refuge areas where guests may be directed to shelter.
- **Plan** where and how they will hand-over incident management responsibility to the emergency services as soon as possible after they arrive at the scene and provide ongoing support to them by coordinating the response of the hotel/conference centre (consider access to CCTV, guest and staff communications etc).
- **Agree** a procedure for reversing lockdown and the release of people from protected/refuge areas so emergency services have a predetermined and structured

approach to this aspect of their intervention and the rescue of guests who are sheltering inside the hotel/conference centre (and staff at the hotel/conference centre can be trained accordingly).

- **Exercise** their plans and procedures with the emergency services to test and validate them, which can also provide an opportunity for staff training and rehearsal and mutual learning that can lead to improvements to plans, procedures, cooperation and interoperability.

Emergency planning for optimal interoperability with the emergency service during a CBRN emergency should be given careful advance consideration and be included int the hotel conference centre emergency plan/annex.

Expected Crowd Behaviours at a CBRN Emergencies

Planning and preparation for all types of hostile threats, including a CBRN attack, requires accurate and up to date knowledge about how people might behave during such incidents. Inaccurate understandings of public behaviour can lead to dangerous and counterproductive practices in crowd management. There is consistent evidence across both hostile threats and other kinds of emergencies and disasters that significant numbers of those affected give each other support, cooperate, and otherwise interact socially within the incident itself. In emergency incidents, competition among those affected occurs in only limited situations, and loss of behavioural control or "panic" is rare.

"It is more effective to learn what people tend to do in disasters and plan around that rather than design your plan and then expect people to conform to it" (Auf de Heide, Common Misconceptions about Disasters, 2004).

Many misunderstandings exist in society about the topic of "panic" and false assumptions are made that "mass panic" is the most likely crowd response during an emergency. Commonly held false assumptions about crowd behaviours during an emergency can be characterized as a belief that:

- selfish and competitive behaviours will override social norms,
- emotions will override rationality,
- crowds will overact in ways that are disproportionate to the threat,
- crowds will make unreasonable and ineffective efforts to escape,
- information about the threat/emergency should be withheld to prevent "mass panic",
- misinformation will spread throughout the crowd like a contagion.

Research about human behaviour in disaster and emergency situations contradicts these commonly held beliefs about the potential for people to "panic". Key findings from various scientific and academic studies about crowd behaviours during emergencies, including CBRN incidents, concluded:

- Over 60 years of research into behaviours described by most people as "panic" are "extraordinarily rare" (Gantt & Gantt, 2012).
- Empirical data shows that typical human behaviour in disaster and emergency situations is prosocial and is based on social bonding/attachments and norms. Supportive behaviours are common, including informational and emotional support.
- Social bonds are not broken during disasters; they tend to be solidified, or even created, by a shared danger/fate. This leads to overwhelmingly prosocial behaviours - strangers help others and delay their own escape.
- Social bonds and norms seem to be stronger than the physiological "fight or flight" responses that might be expected of "panic" responses.
- Fear and panic are not interchangeable; fear does not necessarily lead to panic during a disaster.
- There is an embedded concept in film, media and the public consciousness that people will "panic" and respond with self-interested anti-social survival behaviours at the expense of others.
- A fleeing crowd may not be a panicked crowd; this may represent a rational and reasonable response to a threat and be in line with professional advice (such as RUN, HIDE, TELL).
- Reported injuries from collective running/crowd flight are relatively rare. More reported injuries result from the causes of the collective running/crowd flight incident e.g., fights, fireworks, explosions, terror attacks.
- "During the interviews, participants often used the term "panic" in their description of events. However, they also provided evidence contradicting the notion that "mass panic" occurred" (Hillsborough Disaster, 1989, Cocking & Drury).
- Competitive behaviour was more common in news articles than actual videos of emergencies, whereas cooperative behaviour was more common in video clips than in media text. An imbalance in favour of reporting sensational competitive behaviours suggests a media bias that perpetuates myths of mass panic among the public.

One study or particular relevance to stadiums, "The mass psychology of disasters and emergency evacuations: A research report and implications for the Fire and Rescue Service" (Cocking & Drury 2007), concluded:

- "Co-operation rather than selfish behaviour appears to predominate, even amongst crowds of total strangers".
- "A shared identity means that a danger to the "other" is experienced as a danger to "self", and so people tend to cooperate with those who they share a common fate. It would seem prudent therefore to consider ways of encouraging this common identity and hence cooperation among crowd members during mass emergencies".
- "The findings from this research suggest that far from being a source of potential problems during emergencies, crowds can be part of the solution in ensuring more safe and efficient evacuations, and that the public is often more resilient than they are given credit for".

A further relevant study specifically considering CBRN emergencies, "Mass Casualty Decontamination Guidance and Psychosocial Aspects of CBRN Incident Management: A Review and Synthesis" (Carter and Amlot, 2016), concluded:

- "The main focus was on technical aspects; there was a lack of attention on communication or casualty needs and little consideration given to psychosocial aspects of the incident".
- "Where likely public behaviour was considered there has been a reliance on assumptions from traditional crowd behaviour theories which emphasize the likelihood of mass panic".
- the guidance sources (wrongly) ".... suggest that members of the public are likely to behave in a certain way, and that responder management strategies should be designed to manage this behaviour (e.g. if members of the public are likely to behave in a disorderly or irrational way, they will need to be controlled)".

Another relevant study, "Effective Responder Communication Improves Efficiency and Psychological Outcomes in a Mass Decontamination Field Experiment" (Carter, et. al., 2014), concluded:

- "Communication strategies which are perceived by members of the public as the most effective are those which include health-focused explanations about the decontamination process, information about the actions responders are taking, and sufficient practical information".

- "Improved outcomes included: Increased speed and efficiency of the decontamination process, increased compliance, reduced anxiety, and increased cooperative behaviour among members of the public".

Good practices, principles and conclusions from various studies include:

- Crowds are often slow to recognise and respond to emergencies; "When people die in fires, it is not because of panic, it is more likely to be the lack of panic" (Townsend, 2003).
- Stress of separation from family/loved ones/group can equal (or exceed) the threat of injury during a disaster and they will often delay their escape to account for each other.
- During a crisis in a crowded place there can be a shift in the crowd dynamic from "ME to WE". This collective identity could be the "best asset" during a CBRN crisis rather than a "worst nightmare" (Drury, 2012).
- Disasters tend to bring out the BEST in people, not the BEAST in people. People are more likely to be killed by compassion than competition.
- Ordinary people can act as "first responders" to provide help to others during a disaster and could be provided with practical information about how to hep as the situation unfolds.
- When crowd behaviours in various disaster situations have been compared with CBRN cases (although rare), they appeared to be consistent and should not be differentiated - such as Tokyo Subway Sarin attack, 1995 (Carter, Drury, Amlot, various studies, 2015-2023).
- Some people could overreact to chemical not because of toxic reaction on the organism but to psychological effect of perception of intoxication (i.e. There was an incident in Poland in early 80s when many people were hospitalised when non-toxic but very smelly chemical was used).

Good practices, principles and conclusions concerning crowd communications include:

- Alarms and automated messages are often ignored by crowds. Messages from a person (or human messaging on a public address system) are more effective.
- People are often too slow to recognize an emergency situation and seek confirmatory information from others before acting; the more people present and/or not reacting the more likely they are NOT to recognize an emergency/message.

- People assess the likelihood and severity of consequences in an emergency based on three elements: 1. credibility of the information source(s); 2. the message content (especially threat/risk relevancy); 3. past experience in similar scenarios.
- Using unifying language and supportive forms of communication will enhance unity both within the crowd and between the crowd, the venue operator and the authorities.
- There should be prioritization of informative and actionable risk and crisis communication over emotional reassurances.
- "If crowd behaviour is not only cognitive but also meaningful, this suggests that the public will respond effectively (e.g. co-operatively and in an orderly manner rather than anti-socially or over-emotionally) if given more rather than less information about the nature of the threat" (Cocking & Drury, 2007).
- "… in the past there has been a tendency to withhold information from the public in times of emergencies, despite there being no evidence to support the notion that crowds will necessarily descend into mass panic when told of a threat. There is even evidence (e.g. Proulx & Sime 1991) that suggests the exact opposite, e.g. that providing information about threats can actually increase the speed and efficiency of evacuations" (Cocking & Drury, 2007).
- Members of the public often cooperate with the emergency services and comply with their orders but also question instructions when the rationale is unclear.

All these key findings and good practices concerning crowd behaviour and communications should be incorporated into the stadium's approach to staff training, emergency planning, evacuation procedures, crowd management and public communications. In particular, the following principles should be followed:

- Consider the crowd as a potential solution/ally NOT as "the problem" during an emergency;
- Use the collective crowd identity/prosocial behaviours as an asset/opportunity to be exploited;
- Ensure messaging is clear + concise + relevant + specific about threats and risk(s);
- Provide Information which includes self-help advice and health content;
- Repeat key messages for reinforcement/confirmation AND provide timely updates.

The first response procedures that can be implemented by hotel/conference centre staff during a CBRN emergency have been designed on the basis of these crowd behaviour and communication principles.

7.9. Crisis communication

Crisis communication aims to establish, or sometimes reestablish, trust by demonstrating responsible and transparent management of the situation by the stakeholders. In the event of an CBRN event, the crisis communication carried out by the hotel must be rapid, precise, and perfectly match the situation. Preparedness, and staff training are crucial for an effective response, including communication.

The media are used to broadcasting frightening images during disaster scenarios, and a contamination situation with CBRN agents in a hotel would perfectly correspond to the standards of journalists to arouse the interest of their audience. CBRN situations in public places are often considered events with serious consequences, and it can be difficult to easily reassure the population. Furthermore, it is common in this type of situation for self-proclaimed experts to communicate false or very exaggerated information, spread dangerous messages, further aggravating misinformation or fake information, which could contribute to triggering even more panic and chaos.

In the event of a CBRN incident, the way in which the hotel manages the crisis from the first moments will be an extremely important criterion for its future credibility. This reality applies to all administration or technical levels of responsibility of the hotel, but it also applies to the different agencies and emergency services which response in an inter-service way. Nowadays, the individual and autonomous communication capacities of people are very high instantaneous. Any hotel staff, or guest can immediately communicate with social networks simply with a mobile phone and an internet connection. Thus, as soon as an incident occurs, photos and comments are now transmitted and visible throughout the world, by simple witnesses, without any filter or verification.

During CBRN type incidents, comments and social network reactions are often very far from reality because the technical side of the dangerous capabilities of CBRN is generally not known to most people. Panic often takes hold of the situation, and the unjustified amplification effects, and false of fake information, can complicate the entire response process put in place by the hotel and the emergency services, and relevant authorities.

The objective of crisis communication is therefore to inform effectively without causing panic during a situation involving CBRN agents. It may also be necessary to counter false information that has been very quickly disseminated, whatever the origin of the information, or the transmission methods.

The elements described below should be anticipated to properly prepare the hotel's communication and display its consistent consideration and mastery of the CBRN:

- Prepare pre-written messages and their sending and dissemination procedures in advance to inform staff, customers, and the media.
- Crisis communication must display transparency and honesty towards hotel staff, guests, and authorities.
- If necessary, the hotel must not hesitate to recognize any errors that have been made and quickly inform at minimum those concerned.
- Communication protocols, possibly prepared by professionals, are established to be able to inform staff and customers as quickly as possible of the CBRN incident and its management by the hotel and the competent specialized authorities.

The hotel's communications plan must be the subject of particular care. Clear, consistent messages that are understandable to the public must have been anticipated. No communication managed by the hotel should interfere with the ongoing investigation by law enforcement or health authorities. All messages transmitted in a CBRN crisis must be reassuring and informative.

A crisis telephone number, or equivalent means, must be set up by the hotel so that guest families can obtain information via a dedicated communication channel. The hotel must never communicate medical reports, give figures on the number of victims and never their identity. This information is the exclusive responsibility of the competent authorities.

The key messages to transmit must be identified for each crisis situation. The safety of staff and guests is always the hotel's top priority. It is necessary to reassure and communicate on the measures taken to protect staff and customers, including on the procedures for evacuation, confinement or groupings of people which have been carried out, always in close coordination with the authorities. It is necessary to regularly issue updates and provide information on the situation and current developments.

The hotel must not hesitate to use various communication channels to inform the public as widely as possible. On social networks, the hotel's official accounts can relay the same information to inform the public.

For people still in the hotel before its evacuation, it is possible to use the hotel's loudspeakers, if equipped, to broadcast important information in several languages. Text messages, such as SMS or notifications, can be sent to guests and staff, if the hotel has their contact details.

Hotel staff who have been trained in crisis communication must master the specificities of CBRN situations. This information should be delivered quietly and with empathy, as should always be done in stressful situations. A spokesperson must be designated by the hotel

management to take into account the media and journalists. This spokesperson cannot be, at the start of the crisis, the most senior person in the administrative organization of the hotel, until all the elements of the situation are known. Communication errors can occur early in a crisis, and it is important that they can be corrected later by a more senior hotel spokesperson.

Written statements can be prepared in advance to respond quickly to predictable requests from journalists.

7.10. Training and drills

CBRN awareness and training sessions must be supplemented by field exercises in the hotel, using detection equipment, the protective equipment and implementing the emergency decontamination measures and associated procedures. Scenarios must be varied, creative and provide different radiological, biological or chemical situations which require participants proactive actions. The emergency plans are fully implemented and involve the services and personnel who would be activated in the event of a real situation.

This also pertains to the head of the hotel crisis unit, who should actively fulfil their operational role during exercises and not delegate this responsibility to a deputy, simply because it is a drill. The exercises are carried out regularly and on dates communicated to staff in advance.

The scenario may or may not have been communicated in advance to the participants, depending on the level of difficulty the hotel wishes to give to the exercise. The evacuation procedures are carried out up to the different gathering areas for people to be evacuated, depending on whether they are potentially contaminated or not, or injured. The establishment's sound or light alarm systems are tested during the exercise scenario. The alert and information messages, broadcast by loudspeakers inside the hotel, can be tested in several languages and their effectiveness evaluated.

Hotel staff must be informed in advance that this is an exercise and not a real situation. If the establishment is in usual operation, customers must also be warned so as not to create a panic effect which could have real consequences. People living near the hotel must also have been warned of the exercise so as not to react when the alarms are triggered. The local authorities and response units, if they have not been invited or if they are not taking part in the exercise, must also have been warned of the CBRN exercise taking place in the hotel.

Detection systems can be activated using radiological or chemical simulating products, which are harmless, but trigger a false positive on the detector sensors and therefore cause alarms. During the exercises, the distribution of equipment is complete done or just simulate, but considering the real logistical needs that it would require. CBRN protective equipment,

dedicated to training, can be used but operational protective equipment must be strictly preserved to maintain the full reaction capacity of the hotel.

Emergency decontamination measures are carried out depending on the type of scenario selected for the exercise. Observers may be invited to the exercise. They may or may not be part of another hotel in the same group, depending on the level of visibility that the hotel wishes to grant to this action.

Evaluators can also usefully be included in the preparation and implementation of the hotel's CBRN exercise. They provide an objective opinion on the results obtained by the different teams, response times, positive aspects, and areas for improvement. They deliver a first verbal notice just after the exercise, then a more complete written notice in the days following the exercise. During the exercise, they must carry a sign of recognition to be able to be identified by hotel security personnel as not being people to be treated as hotel guests. The evaluators can be members of specialized CBRN emergency services or be CBRN referents from the hotel, or from another hotel.

Communication procedures towards the authorities, towards customers, and towards journalists, are totally carried out and the information provided must be compatible with the hotel's emergency plan. The emergency services may possibly be requested to be part of the preparation or the implementation of the exercise. Journalists can also be invited, to really test the hotel's communication capabilities, or to give visibility to the event according to the hotel's wishes.

Participants can play the role of the customers to be evacuated, in variable configurations, contaminated or not, possibly injured. Depending on the level of difficulty sought, this clientele may have instructions from the management of the exercise, to be more or less cooperative with the instructions received by the hotel security teams.

A crisis centre must be activated in the hotel during the exercise. It has information provided by the different teams on the field as well as by the hotel's video surveillance system when available. The crisis centre is in a protected area of the hotel and cannot simultaneously be responsible for crisis communication. The leader of the crisis centre of the hotel, during the exercise, should be is the one who would really be in charge in the event of a real CBRN situation.

A dedicated team, trained in exercise organisation, is responsible for managing the different phases of the scenario and scheduled incidents. In case of real danger or serious incident, this team can stop the exercise at any time. A medical team should be available to take care of a possible real injury during exercise. This medical team does not participate in the exercise and should only be engaged in the event of an actual injury to an exercise participant.

At the end of the exercise, a complete assessment is established, specifying the positive effects obtained, the progress compared to previous exercises, and the areas of effort remaining to be made.

This information can be shared with other hotels, particularly within the same group, or remain confidential depending on the hotel's communication wishes.

7.11. Review and continuous improvements

All parameters that contribute to crisis management, from its preparation to the response phase, must be regularly reviewed and optimized.

Technologies evolve, threats change, the hotel's industrial environment may change as well, and these parameters must be considered so that the hotel's response plan remains up to date. In terms of human resources, staff placed in key positions in the hotel can be regularly replaced as part of the normal operation of the hotel and the career development of staff. These usual and normal elements require never freezing a security system and considering it as eternally valid and valid.

Depending on the evaluations of the CBRN exercises carried out, or the real situations which have occurred in the hotel or in other similar establishments, the system can and must be re-evaluated, to verify its relevance and guarantee a truly effective and optimized response in the event of a major incident.

It is important to note that all CBRN security measures, as for security measures linked to conventional situations, must be adapted to the financial, logistical, and operational capacities that are granted by each establishment.

The geographical area in which the establishment is located, and its proximity to identified risks or sensitive sites, makes it unique.

The regular review of a hotel's CBRN system is specific to it and depends on its characteristics, but part of the updating of its prevention, detection and response provision can also be pooled and shared with other hotels whether they are of the same group or not.

It is important to ensure that the implementation of CBRN measures taken by the hotel corresponds and complies with local and national regulations in terms of safety and public health. New regulations may sometimes require changes to planned measures in the hotel's emergency response plan.

Partnerships concluded with local authorities and emergency services can help technically to consider these legal modification constraints. The development of the network of partners, around the theme of CBRN security, should lead to the sharing of knowledge and content of training programs.

Improvements in CBRN alert detection and their management, evacuation procedures, customer care, crisis communication management or operational information management in the event of an incident are common objectives for many hotels. These processes can therefore be improved and reviewed jointly between hotels. During renewal or maintenance procedures for CBRN detection devices or protective equipment, grouped orders can reduce financial costs and are preferred if the needs are identical between establishments and correspond to their identified operational needs.

To improve and review the identification of local needs and the suitability of the equipment delivered, the hotel team in charge of CBRN security issues must have been included in the equipment selection since the beginning of the selection processes.

Training, especially when conducted in collaboration with specialized CBRN emergency services, should facilitate the enhancement and revision of the hotel's CBRN response plans and procedures.

The operation of the detection equipment, and the related procedures for confirming and transmitting the alert to the relevant services, must be maintained operational full time, and optimized when necessary. As part of continuous improvements, training standards can always be improved based on evaluations conducted after each training session. Participants can fill in a training evaluation form to check that their needs match the CBRN awareness or training session given. Certificates or training certificates can be given to participants, with increasing levels and degrees of awareness, knowledge, and advanced progression. CBRN training sessions must be recognized by the hotel or the group, be standardized, and be considered as an enhancement in their professional career or their possibility of career development.

The hotel can create several categories of trained personnel: operators, referents, and assistant instructors or CBRN safety instructors. When these personnel have reached a sufficient level of training, and technical and educational qualification, they can be responsible for sharing their knowledge with other establishments in the same group. The hotel can thus improve its training system internally and promote it.

7.12. Regular maintenance and inspections

Maintenance operations for CBRN detection and protection equipment must be integrated from the beginning of the needs assessment process. Their cost in time, staff and budget must have been anticipated and validated by the hotel directorate.

A dedicated person is designated to be responsible for the maintenance's operations of CBRN equipment of the hotel. This person has one or more deputy, with similar qualification on CBRN equipment, and the checks to be carried out. "Checks and inspections are carried out on a regular basis." The control operations are recorded on a document which specifies who

carried out the control, when, and what the results were. This document is signed by the equipment manager and saved.

The deadlines for the calibration or maintenance of CBRN equipment, given by the manufacturers or constructors, must be followed to guarantee the proper functioning of the equipment, extend the operational life, and maintain the warranty periods offered by the suppliers of CBRN equipment and related spare parts. CBRN detection equipment must be tested with the appropriate calibration sources and at the recommended frequencies. Fixed portal type detection equipment must be checked on site. Portable or handheld equipment can be checked in their storage rooms. They must switch on without any source of contamination nearby to allow their correct initial calibration.

Electric batteries, accumulators, chargers, and other power systems for portable devices must always be available and fully operational. The lifespan of the batteries must be monitored to guarantee acceptable operational autonomy.

The validity dates of CBRN protective equipment or emergency decontamination equipment must be included in the control process. The renewal of expired equipment must be requested considering order and delivery times.

The conditions of storage premises must be controlled regarding temperature, humidity, and light according to the equipment manufacturer's instructions. The storage compatibility possibilities of certain materials or equipment must be confirmed and checked. The good conservation of CBRN materials and their packaging must be checked periodically.

If the hotel has emergency cut-off devices for ventilation or air conditioning systems, they must be regularly checked and tested by the personnel responsible for implementing them in the event of an emergency. If the hotel has water or air filtration systems, the condition of the filters must be checked, and the replacement frequencies must be known to the hotel's maintenance teams and respected.

If the hotel has drinking water tanks, access must be secure, and ideally placed under alarm and video surveillance.

Controls of protective equipment should include control of security systems for access to local storage.

Any anomaly or defect must be reported immediately, and verification measures must be carried out to identify the causes.

Any detection of a vulnerability that could weaken CBRN detection, or any attempt to sabotage or neutralize a security system, whether or not linked to CBRN devices, must be immediately reported to the competent services of the hotel.

8. Conclusion

In a technologically evolving world, the hotel industry faces complex security challenges, highlighted by past incidents like the Fukushima disaster, Beirut explosion, and Tokyo's Sarin gas attack. The increasing presence of chemical, biological, and radiological (CBRN) materials necessitates a reassessment of risks, as conventional security measures are no longer adequate. Hotels, often busy with diverse guests, are attractive targets for malicious groups.

While CBRN events are low-probability, their potential impact is significant, requiring hotels to prioritize these threats alongside conventional ones. Some high-profile hotels have implemented additional measures, but many vulnerabilities remain. The hospitality industry must adopt proactive security approaches, including comprehensive risk assessments and robust protection measures.

CBRN threats, whether accidental or intentional, are serious concerns for crisis managers. The evolving environment and the use of dangerous materials for industrial or medical purposes increase the risk of these materials being misused. Strengthening CBRN security in hotels involves identifying potential threats, understanding risks, and implementing detection and response strategies to ensure guest and staff safety. This approach includes raising awareness among decision-makers and proposing prevention, intervention, and crisis management strategies to address CBRN threats effectively.

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