POSSIBLE DECONTAMINATION AFTER A TERRORIST ATTACK ON A NUCLEAR POWER PLANT

[a]PETR HOUDEK, [b]DAGMAR BARTIKOVA

[a]*Czech Technical University in Prague, Faculty of Biomedical Engineering, Department of Health Care and Population Protection, nám. Sítná 3105, 272 01 Kladno, Czech Republic, email:* [a]*houdepe4@fbmi.cvut.cz*

Abstract: This paper focuses on analyzing the potential for decontamination following a terrorist attack on the Temelín Nuclear Power Plant. The assessment of current decontamination procedures was conducted using qualitative research methods, specifically through interviews with professionally qualified personnel. The interviews were carried out at the Temelín Nuclear Power Plant and involved selected staff from the Radiation Protection Department and members of the plant's Fire and Rescue Service. The aim of this paper is to evaluate the current state of preparedness.

Keywords: contamination, decontamination, ionizing radiation, radiation emergency, radiation protection, terrorist attacks.

Introduction

The safety of nuclear power plants is a key element of energy stability and national security in the Czech Republic. In view of developments in the international situation and the increasing threat of terrorism targeting critical infrastructure, it is essential to focus not only on preventive measures but also on preparedness for managing the consequences of emergency situations. One of the most severe scenarios involves a potential terrorist attack on a nuclear facility, which could result in the release of radioactive substances and subsequent environmental contamination.

This paper aims to analyze the current state of decontamination procedures in the event of a radiation emergency at the Temelín Nuclear Power Plant. The study emphasizes the practical aspects of decontamination processes from the perspective of radiation protection personnel and members of the Temelín Fire and Rescue Service. Using qualitative research, based on structured interviews, the study evaluates their experience, equipment, methodologies, and the effectiveness of the used procedures. The results of the analysis provide an overview of the preparedness of individual units to respond to a radiation emergency caused by a terrorist attack and offer recommendations for improving the decontamination system.

1 Temelín nuclear power plant

There are two nuclear power plants in the Czech Republic: the Dukovany Nuclear Power Plant and the Temelín Nuclear Power Plant. Both power plants are equipped with WWER (water-water energy reactor) nuclear reactors and operate on the similar principle. However, they differ in terms of power output and structural layout (4, 18). The Dukovany Nuclear Power Plant is located on the border between the Vysočina and South Moravia regions and was commissioned in 1985–1988. It consists of four WWER 440 model V-213 pressurized water reactors. Each unit has a capacity of 510 MWe, giving the plant a total output of 2040 MWe (19).

The Temelín Nuclear Power Plant, situated in the South Bohemian region, was commissioned in 2002. Electricity is generated here by two WWER 1000 type V 320 production units. Each unit has a capacity of 1125 MWe, giving the plant a total output of 2250 MWe. Like Dukovany, Temelín generates approximately 15 TWh of electricity annually. To support the cooling system, the Hněvkovice Reservoir was constructed on the Vltava River (17, 18).

1.1 Terrorist attacks on nuclear power plants

Nuclear power plants are electricity-generating facilities and constitute an important and integral part of critical infrastructure. One potential cause of contamination at a nuclear power plant could be a terrorist attack. In the past, terrorist organisations have demonstrated their willingness and ability to target critical infrastructure (3). Although nuclear power plants belong to the group of so-called "hard targets" - targets with a high level of protection against attack and unauthorized access. Terrorist objectives include: a) causing casualties (injuries and deaths), b) damaging or destroying critical infrastructure, c) disrupting the economy, d) harassing, weakening, or discrediting the government, e) discouraging tourism or investment due to perceived uncertainty, f) compelling people to change their daily routines or lifestyles (1). According to the US Department of Homeland Security (DHS), terrorism is defined as any activity involving an act that "is dangerous to human life or potentially destructive to critical infrastructure or key resources, and… must also be intended to: a) intimidate or coerce a civilian population, b) influence government policy through intimidation or coercion, or c) affect government conduct through mass destruction, assassination, or kidnapping" (6). Therefore, it is essential to address this issue. Terrorism targeting energy facilities, pipelines and transport routes is an increasingly significant threat to energy security, partly due to general tensions in global oil and gas market (5).

1.2 Contamination

Despite systematically implemented radiation protection measures, undesirable contamination with radioactive substances, known as contamination, may occur under certain circumstances. Contamination can result from a leak (planned or unplanned) from the primary circuit technology, causing radioactive substances to escape into the environment and potentially cause surface or air contamination (10).

Surface contamination
In this case, radioactive substances settle on the surface of people or objects, so surface contamination is not caused by radiation. Depending on whether the radioactive substance can be removed from the surface, surface contamination is classified as either removable and non-removable. The unit of measurement for surface contamination, or surface activity, is Bq/m² and its presence can be detected by using measuring instruments, hand-held devices or monitors for people. Effective protection against surface contamination includes the use of personal protective equipment and protective work equipment (10, 8).

Internal contamination
Internal contamination of a person occurs when a source of ionising radiation enters the body and irradiates it from within. Radionuclides can enter the body via inhalation, ingestion, or absorption through the skin. Depending on the properties of the radionuclide, various processes occur in the human body. Some radionuclides can be quickly eliminated by the body, while others, known as biogenic radionuclides, can accumulate in certain target organs (critical organs), which are then exposed to ionising radiation to a greater extent than other tissues. An example is the radioactive isotope iodine ^{131}I, which is released into the environment in the event of a nuclear accident and, when ingested, settles in the thyroid gland and causes its irradiation. To prevent this process, one of the immediate protective measures during a nuclear accident is to take iodine tablets, known as iodine prophylaxis. The purpose is to saturate the thyroid gland with stable iodine, thereby protecting it from radioactive iodine. A high incidence of thyroid cancer has been observed primarily among individuals who were the Chernobyl Nuclear Power Plant at the time of the accident. In contrast, during the Fukushima nuclear accident, timely evacuation and other protective measures successfully prevented contamination with radioactive iodine (10, 7).

The intake of radionuclides by the human body can be assessed through direct or indirect measurement methods. Direct measurement is performed using a FastScan monitor, designed for rapid assessment of internal contamination, and whole-body counters, which determine the distribution and activity of individual radionuclides in the human body. For iodine assessment in the thyroid gland, a specialized detector is applied directly to the gland. The presence of tritium is detected by analyzing urine samples. Indirect methods are based on estimating the effective dose or equivalent dose to be determined in situations where direct measurement cannot be used (lack of a whole-body monitor or inability to measure certain radionuclides by direct methods) or in emergency monitoring, when it is necessary to track the behaviour of radionuclides in the human body. Indirect measurement is based on the analysis of excreta, monitoring the working environment, or knowledge of the specific activity of radionuclide activity in the food chain (10, 7, 20).

1.3 Decontamination

Decontamination is a set of methods, procedures, organisational measures and means designed to effectively remove hazardous substances. It is a process aimed at reducing the spread of harmful materials, preventing secondary surface and internal contamination, and minimizing the risk of human exposure to radioactive substances through surface contamination. The objective of decontamination is to reduce the content of a hazardous substance to a safe level or to completely remove the substance from the surfaces of people, material resources and equipment. Its main purpose is to mitigate health consequences for affected persons, prevent irreversible damage, and shorten the duration of protective equipment use (14, 11, 12).

Depending on the type of harmful substance being removed, the following types of decontamination are distinguished:

- detoxification (decontamination) – chemical substances,
- decontamination – radioactive substances,
- disinfection – biological substances (15).

Decontamination is subdivided depending on the method applied:

- Dry decontamination method
- Wet decontamination method (15).

Furthermore, decontamination methods are divided into:

- Mechanical – suction, wiping, washing, uncovering, coating, etc.
- Physical – evaporation, sorption, dilution, etc.
- Chemical – based on changing the molecular structure of the contaminant through its reaction with a decontaminating agent, leading to decomposition or its transformation into less hazardous substances or substances that are easier to remove.
- Combined – a combination of the above methods (15, 13).

1.4 Decontamination carried out by radiation protection service personnel

Primarily, decontamination (or deactivation) of individuals and personal items contaminated during routine operations is performed by operational radiation protection personnel within the so-called emergency hygiene loop area (9).
Skin decontamination is performed to reduce contamination to the lowest possible level without causing skin damage. The procedure for proper and effective decontamination must be strictly followed. The first step is always hand decontamination, followed by other contaminated body parts.

Skin washing is typically carried out using decontamination soap and lukewarm water for about 2–3 minutes to prevent overhydration of the skin, as washing with hot water leads to undesirable pore opening and dilation. The process then continues according to the contaminated body area, always proceeding from top to bottom. Care must be taken to ensure that water does not enter the eyes or body openings, and particular attention should be paid to thorough cleaning of hard-to-reach areas and places where contamination easily accumulates, such as under the nails and between the fingers. The total duration of decontamination should not exceed approximately 8 minutes.

After decontamination, a measurement is taken on the monitor. If decontamination has not been successful, the next cleaning cycle continues at approximately 10-minute intervals so as not to damage the skin. If cleaning is unsuccessful, the next decontamination cycle should be performed. The procedure usually progresses from the use of mild decontamination agents to stronger ones, from warm water, washcloths, acidic soap, through detergents such as Jar, Odekon, soda, Chelaton, citric acid, to actions such as cutting nails, shaving beards and hair, and cutting hair. If contamination is found in the head area, there is a risk of internal contamination, so it is always necessary to ensure measurement on FastScan or a whole-body detector. If decontamination carried out by dosimetrists in an emergency hygiene loop is ineffective i.e. the surface activity exceeds 0.3 Bq/cm^2, the contaminated person is sent for special decontamination at the company's medical centre (9, 7).

Dosimetrists also perform decontamination of small personal items such as ID cards, mobile phones, and dosimeters. To remove radioactive substances, they use industrial alcohol or adhesive tape to capture hot particles (16). Decontamination of technological systems and equipment is carried out by a specialized contractor using the previously mentioned methods — dry or wet techniques, and mechanical, physical, and chemical processes.

1.5 Decontamination performed by the plant fire and rescue service

Both the Temelín Nuclear Power Plant and the Dukovany Nuclear Power Plant have their own fire brigades, which are based directly in the secured area of the power plant. Their primary task is to be ready for possible action within the plant area, although they also operate in the surrounding region. Their daily tasks include technical interventions and assistance, such as fire watch during work on specific equipment, securing personnel, rescuing individuals from elevators, and other activities. One of their essential activities is performing the decontamination of both radioactive and chemical substances, which are also used at nuclear power plants (2).

When carrying out decontamination, the fire service at nuclear power plants follows the national methodological instructions of the Operational Manual for Fire Protection Units – Tactical Intervention Procedures, specifically Instruction No. 4N "Hazard of Ionising Radiation," No. L6 "Decontamination, Decontamination Area," No. L7 "Decontamination of Responders," No. L9 "Decontamination of Radioactive Substances," as well as the Standard Operating Procedure for Integrated Rescue System Units during Joint Intervention STČ – 01/IZS "Dirty Bomb." Decontamination is further performed in accordance with the specific action plan included in the External Emergency Plan for the Temelín and Dukovany Nuclear Power Plants (14).

The units decontaminate individuals exposed to hazardous substances, in the operation who have been exposed to hazardous substances, external surfaces of equipment, transport containers used for storing material resources, and material resources that cannot be placed in transport containers (17).

2 Methodology

For the purposes of analysing existing decontamination procedures at nuclear power plants, the Temelín Nuclear Power Plant was selected because it is our workplace and access to the necessary information is easier. It should be noted, however, that both sites share a unified management structure and follow the same procedures and methodologies; therefore, decontamination practices are standardized across both locations.

As nuclear power plants are among the most highly secured facilities in the country, certain information is classified. Consequently, only details that do not compromise the security of the facility will be presented.

The analysis of the current state of decontamination procedures was carried out using qualitative research, specifically through interviews with professionally qualified personnel.

One of the qualitative research methods used was interviews, which were divided into two groups: interviews with staff from the radiation protection department and the other with members of the plant's Fire and Rescue Service. Each group was asked questions to best capture their activities within the decontamination process. All employees who participated in the survey were employees of the Temelin Nuclear Power Plant. Interviews were selected as the research method due to the small number of employees in these positions, as well as because these individuals have a wealth of extensive experience, knowledge, and often many years of practice.

Prior to conducting the interviews, preparatory work was carried out, during which a set of questions relating to the issue was developed. This test set of questions was presented to one test subject from both the radiation protection department and the fire and rescue service. Based on the responses and feedbacks, the interview questions were slightly modified to reflect the topic as accurately as possible.

Interviews were then conducted with individual employees, with the aim of including at least one representative from each shift shift to ensure respondents were as independent as possible. Since the composition of these shifts is more or less constant, a certain precedent may be established, which everyone in the group follows. Data collection lasted several weeks, as all shifts needed to rotate through duty. The research was initially discussed with the heads of the relevant departments to determine whether and to what extent the information obtained could be used.

Each interview lasted approximately 10–15 minutes and was conducted at the respondent's workplace, i.e. in the case of dosimetrists, in the Central radiation control room, and in the case of firefighters, in the fire department of the plant. Before the interview, the respondent was informed of its purpose and objectives.

2.1 Description of the research sample

A total of 9 employees of the Radiation protection department at the Temelin Nuclear Power Plant were interviewed. Among them, 5 served as radiation safety technicians, 3 as Shift supervisors for Radiation control, and one as a Radiation risk management specialist. Additionally, 10 members of the fire and rescue service were interviewed, including 5 fire engine operators, 3 operations officers, and 2 team commanders.
The data was subsequently evaluated and analysed, and specific research categories were selected for which responses were prepared. Based on the findings, procedures were proposed to improve the current situation.

Decontamination of individuals and small objects, as well as decontamination within the controlled area at the Temelín Nuclear Power Plant, is carried out by radiation protection personnel operating in continuous 8- hour shifts. Six shifts alternate according to the established schedule (red, purple, yellow, green, blue, and brown). In addition, two supplementary shifts — replacement and rainbow — have been created to reinforce standard shifts in the event of absence of permanent members. The shift is usually made up of a radiation control shift supervisor, who is the shift leader, and is in contact with the managers of other technological systems. The shift also includes radiation safety technicians, who work in shifts of at least two people (usually three), such a shift group is legally mandatory in accordance with the limits and conditions, and failure to meet these requirements would constitute a violation of the Atomic Energy Act. The morning shift from Monday to Friday is additionally reinforced by an additional day shift, which, however, is not limited to the minimum number of dosimetrists on duty.

Decontamination of both chemical and radioactive substances outside the controlled area is carried out by the fire and rescue service of the Temelín Nuclear Power Plant. They operate in a continuous 12- hour shift system, alternating between four shifts (red, yellow, green and blue) replacing each other according to the established schedule. During each shift, the minimum number of firefighters on duty is 15, although typically 20-22 personnel are on duty.

In addition, in high-risk situations, decontamination is carried out by medical workers employed at the Temelín Nuclear Power Plant. From Monday to Friday, a plant doctor works on the morning shift at the nuclear power plant, but at the same time, rescuers from the South Bohemian Region work 12- hour shifts, each of whom actually works one shift per month.

2.2 Data collection

As part of the research, two sets of interviews were conducted on decontamination with experts working at nuclear power plants, specifically with employees of the radiation protection department who perform decontamination in the controlled area, as well as with employees of the plant's fire and rescue service, who carry out decontamination during incidents outside the controlled area. Both departments are part of the organisational structure of the security devision, which is common to both plants.

The questions were formulated in advance as follows:

- **Radiation Protection (RP) Department Employees**
  1. Have you undergone specialized training in radiation protection?
  2. How often do you perform decontamination of individuals?
  3. Which documentation do you use to carry out decontamination?
  4. What methods do you use to perform decontamination?
  5. What equipment do you use?
  6. How effective is the decontamination you carry out?
  7. How do you handle contaminated water and the means used for decontamination?

- **Fire and rescue service employees (FRSE)**
  1. Do you undergo special training in decontamination/radiation protection?
  2. How often do you conduct decontamination training?
  3. Have you ever carried out decontamination (not training)?
  4. Have you undergone special training in decontamination/radiation protection?
  5. What equipment and techniques do you use when performing decontamination?
  6. How effective is the decontamination you carry out?
  7. How is contaminated water and equipment handled?

3 Results of interviews

This section presents the results of interviews conducted with employees of the radiation protection department and members of the plant's Fire and Rescue Service based on the questions asked.

Analysis of interviews

- **Radiation protection department staff**

The results of the interviews with employees of the Radiation Protection Department were divided into seven groups using coding

1) Education and qualification requirements (The results for this area are presented in Tab. 1)

Tab. 1: Category Education and qualification requirements [own]

Professional competence for performing activities from the perspective of radiation protection	All respondents unanimously stated that they had successfully completed a special professional competence course at the State Office for Nuclear Safety, commonly referred to as the PI course.
Basic training for nuclear power plant employees	All employees also mentioned that they had completed basic training at the ČEZ training centre, specifically modules M1 and M2.
Internal examinations	Additionally, they noted that it is necessary to pass so-called corporate examinations.

2) Frequency of decontamination (The results in this area are presented in Tab. 2)

Tab. 2: Category Frequency of decontamination [own]

During the main production unit (MPU) shutdown	During the shutdown of MPU, decontamination is performed much more frequently, several times a day.
Outside MPU shutdown	Outside of shutdown periods, it occurs only a few times a month.

3) Documentation and experience (The results in this area are presented in Tab. 3)

Tab. 3: Category Documentation and experience [own]

Method	The procedure for decontaminating personnel is established in the internal methodology "Radiation Protection Rules in the Controlled Area".
Subdivision specification	Further details are specified in the departmental instructions of the radiation protection department.
Operational experience	When performing decontamination, many dosimetrists rely on their many years of extensive experience and guidance from colleagues.

4) Method of implementation (The results in this area are presented in Tab. 4)

Tab. 4: Category Method of Implementation [own]

Decontamination method	The first step is to remove the work overalls and then wash the hands. If this is not sufficient, the individual should take a full-body shower from head to toe, ensuring that water does not enter body orifices. Initially, warm water and soap are used for a maximum of 8 minutes, which removes up to 90% of contamination. If several consecutive decontamination cycles are performed, after approximately 3 repetitions, the skin becomes softened; therefore, it is necessary to wait at least 20 minutes before the next cycle. In more complex cases, creams (Nivea, ISOLDA) are applied or procedures such as shaving, depilation, and hair cutting are performed. In practice, decontamination is carried out by the contaminated individual, and the dosimetrist determines how to carry out decontamination.

5) Means used (The results in this area are presented in Tab. 5)

Tab. 5: Category Means used

Means used	Decontamination typically involves the use of warm water, decontamination soap (or non-decontaminating soap), shampoo without conditioner, a 2% citric acid solution, a brush, nail scissors, hair scissors, a razor, and adhesive tape. Technical alcohol is used for decontamination of objects.

6) Decontamination results (The results in this area are presented in Tab. 6)

Tab. 6: Category Decontamination result [own]

Effectiveness of decontamination	The effectiveness of decontamination carried out by radiation protection service personnel is practically 100%, however, no formal statistics are maintained, and no contaminated individuals have required medical attention or consultation with healthcare professionals. Sometimes it is difficult to remove contamination, and the whole process takes longer. During decontamination, breaks are necessary to prevent skin maceration. During the operation of the nuclear power plant, there have been several cases where decontamination was unsuccessful, but even these individuals did not need to be referred to a doctor or medical personnel. The contamination level did not exceed any threshold requiring medical intervention but was higher than the clearance level for release into the environment. If internal contamination is suspected, typically involving only a few individuals during an outage, the person is sent to the personal dosimetry control station, where measurements for internal contamination are performed using a FastScan monitor and a whole-body counter. In all cases, internal contamination was not confirmed, and no medical intervention was necessary. Consequently, there was no need to activate the internal trauma plan, as the effective dose commitment threshold requiring referral to a physician was not exceeded.
Procedure in case of unsuccessful decontamination	When decontamination is unsuccessful, workers follow the procedures described in the internal documentation. At the same time, they consult with the shift radiation control supervisor and, above all, with the head of the radiation protection and radiation risk management department.

7) Radioactive waste management (RAW) (The results in this area are presented in Tab. 7)

Tab. 7: Category RAW management [own]

RAW management	Wastewater generated during the removal of radioactive substances is directed into a special sewer systém and then routed to a filtration station

	in the active support services building. Tools (such as brushes, scissors, etc.) that come into contact with contaminated materials either decontaminated with water or alcohol, or disposed of at the designated collection point in the fragmentation area.

Analysis of conducted interviews

- **Employees of the fire and rescue service of the enterprise (FRSE)**

The results of interviews with members of the Fire and Rescue service at the Temelín nuclear power plant were coded and divided into seven categories.

1) Education and qualification requirements (The results in this area are presented in Tab. 8)

Tab. 8: Category Education and qualification requirements [own]

OMEGA training	Firefighters complete an introductory training course called OMEGA
Training in radiation protection	Regarding radiation protection or chemical safety, the employer does not require specialized training in these areas. If an employee has undergonecompleted such training, it was during the employment with the regional fire service.

2) Decontamination training (The results in this area are presented in Tab. 9)

Tab. 9: Category Decontamination training [own]

Conducting decontamination training	Training exercises focused on decontamination of radioactive or chemical substances are conducted four times per year for each shift.

3) Frequency of decontamination (The results in this area are presented in Tab. 10)

Tab. 10: Category Decontamination frequency [own]

Decontamination frequency	Since the nuclear facility was commissioned, no real decontamination of radioactive substances has been required. However, firefighters have experience in performing chemical substance decontamination.

4) Documentation and experience (The results in this area are presented in Tab. 11)

Tab. 11: Category Documentation and experience [own]

Decontamination procedures	At the nuclear power plant, operations follow the operational regulations of the firefighting units.

5) Decontamination techniques and equipment (The results in this area are presented in Tab. 12)

Tab. 12: Category Decontamination techniques and equipment [own]

Techniques and equipment for decontamination	For simplified decontamination, only fire hoses and tarpaulins are used. Otherwise, an inflatable decontamination tent is employed, and if necessary, a shower, a water tanker truck, and a gas mask machine.

6) Decontamination results (The results in this area are presented in Tab. 13)

Tab. 13: Category Decontamination results [own]

Decontamination results	Decontamination performed by FRSE is effective, consistently meeting all required limits.

7) Radioactive waste management (The results in this area are presented in Tab. 14)

Tab. 14: Category RAW management [own]

RAW management	If wastewater is found to be contaminated, it is pumped out and disposed of by a specialized company. Contaminated equipment is either decontaminated to the required levels or disposed of as radioactive waste. The disposal of radioactive materials and water is managed by a commander or a dosimetrist.

Conclusion

The analysis presented in this paper confirmed the high level of preparedness and professional competence of personnel in the field of decontamination. Interviews revealed that both radiation protection staff and members of the plant's fire and rescue service possess the necessary knowledge, experience, and technical resources to manage radiological emergencies effectively. Current decontamination procedures are proven to be effective in practice and are implemented in accordance with internal guidelines and national regulations.

However, the study revealed certain differences in the frequency of professional training and the level of specialised exercises among different groups of employees. It is therefore recommended to strengthen a unified system of regular training and practical drills, including scenarios simulating non-standard situations such as targeted terrorist attacks.

Overall, the decontamination system at the Temelín Nuclear Power Plant is functional and well-organized. Future development should focus on achieving an even higher level of coordination between departments and systematically enhancing resilience to potential threats.

Literature:

1. Bennett, Brian T. Understanding, assessing, and responding to terrorism: protecting critical infrastructure and personnel. Second edition. Hoboken: Wiley, 2018. ISBN 978-1-119-23778-5.
2. Bezděk J. Hasiči v Jaderné elektrárně Dukovany slouží už 40 let [Internet]. Skupina ČEZ; 2022 [cited 2024 Feb 11]. Available from: https://www.cez.cz/cs/pro-media/tiskove-zpravy/hasici-v-jaderne-elektrarne-dukovany-slouzi-uz-40-let-163227
3. Bueger C, Liebetrau T, Franken J. Security threats to undersea communications cables and infrastructure – consequences for the EU [Internet]. Brussels: European Parliament; 2022 [cited 2025 May 6]. Available from: https://op.europa.eu/
4. Burket D, Loužek M, editors. Jaderná energie: útlum, nebo rozvoj? Praha: CEP; 2007. ISBN: 978-80-86547-78-7.
5. Dančák B, Závěšický J. Energetická bezpečnost a zájmy České republiky. Brno: Masarykova univerzita; 2007. ISBN: 8021044403.
6. Hoffman B. Inside terrorism. Rev and expanded ed. New York: Columbia University Press; 2006. ISBN: 0-231-51046-2.
7. IAEA. Occupational radiation protection. Vienna: IAEA; 2018. ISBN: 978-92-0-102917-1.
8. Koc J, et al. Organizační a technické požadavky na zajištění radiační ochrany... [Internet]. SÚRO; 2017 [cited 2024 Jan 2]. Available from: https://predmety.fbmi.cvut.cz/cs/F7PMCROJB
9. Koláček B. Radiační ochrana v ETE. Brno: ČEZ; 2022. (Interní dokument).

10. Kolektiv autorů. Radiační ochrana pro vybrané pracovníky [Internet]. ČEZ; 2019 [cited 2024 Jan 2]. Available from: https://www.cez.cz/edee/content/file/vzdelavani/skoleni/skoldoh prac/zoz_ro.pdf
11. Kotinský P, Hejdová J. Dekontaminace v požární ochraně. Ostrava: SPBI; 2003. ISBN: 80-86634-31-0.
12. Kratochvílová D, Folwarczny L. Ochrana obyvatelstva. 2nd ed. Ostrava: SPBI; 2013. ISBN: 978-80-7385-1347.
13. Matoušek J, Urban I, Linhart P. CBRN: detekce a monitorování, fyzická ochrana, dekontaminace. Ostrava: SPBI; 2008. ISBN: 978-80-7385-048-7.
14. Ministerstvo vnitra. Krizové řízení při nevojenských krizových situacích… Praha: MVČR; 2021. ISBN: 978-80-7616-097-2.
15. Sdružení požárního a bezpečnostního inženýrství. Bojový řád jednotek požární ochrany. Ostrava: SPBI; 2017. ISBN: 978-80-7385-197-2.
16. Severa J, Bár J. Handbook of radioactive contamination and decontamination. Amsterdam: Elsevier; 1991. ISBN: 0-444-98757-6.
17. Skupina ČEZ. Jaderná elektrárna Temelín [Internet]. 2024 [cited 2024 Jan 1]. Available from: https://www.cez.cz/cs/o-cez/vyrobni-zdroje/jaderna-energetika/jaderna-energetika-v-ceske-republice/ete
18. Skupina ČEZ. Jaderná energetika v České republice [Internet]. 2024 [cited 2024 Jan 1]. Available from: https://www.cez.cz/cs/o-cez/vyrobni-zdroje/jaderna-energetik a/jaderna-energetika-v-ceske-republice
19. Skupina ČEZ. Technologie a zabezpečení [Internet]. [cited 2024 May 1]. Available from: https://www.cez.cz/
20. Wagner V. Fukušima I poté. Praha: Novela Bohemica; 2015. ISBN: 978-80-87683-45-3.

Primary Paper Section: A

Secondary Paper Section: AQ