

NUCLEAR HAZARDS

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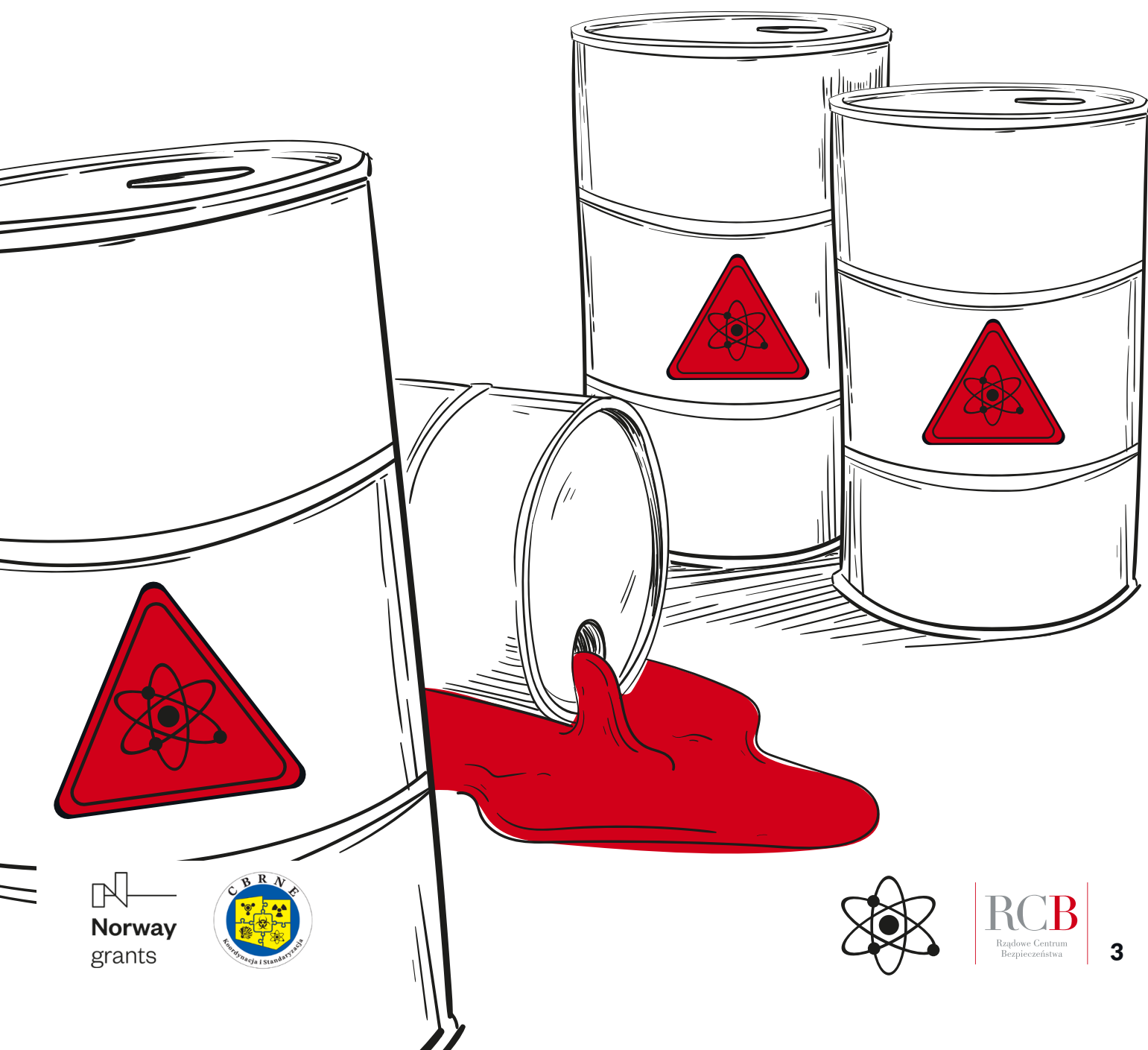
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1. Nuclear emergency

What is a nuclear emergency?

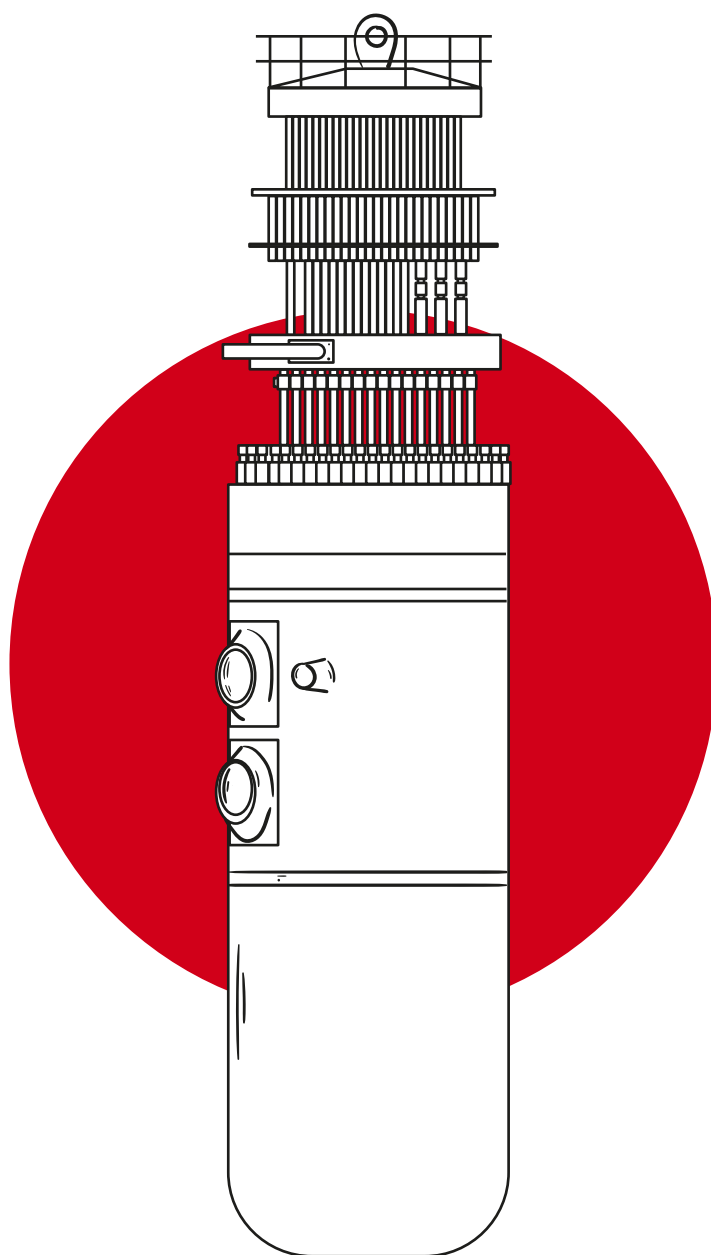
The term nuclear emergency refers to the uncontrolled release of a radioactive substance into the environment. It is defined by the International Atomic Energy Agency (IAEA) as an event that results in significant consequences for people, the environment or facility.



Where are nuclear materials used in Poland?

There is only one nuclear reactor in Poland - the Maria nuclear research reactor in Otwock, which is managed by the National Centre for Nuclear Research. Radioactive waste is stored at the National Radioactive Waste Repository (KSOP) in Różan (about 90 km from Warsaw).

A nuclear power plant is planned in Poland. Although it is not on the national territory, this does not mean that there are no hazards of nuclear emergency consequences!



2. Causes and types of nuclear emergencies

The most common causes of contaminations

Nuclear emergencies can be caused by failure, accident or intentional action by an individual.

Causes of emergencies:

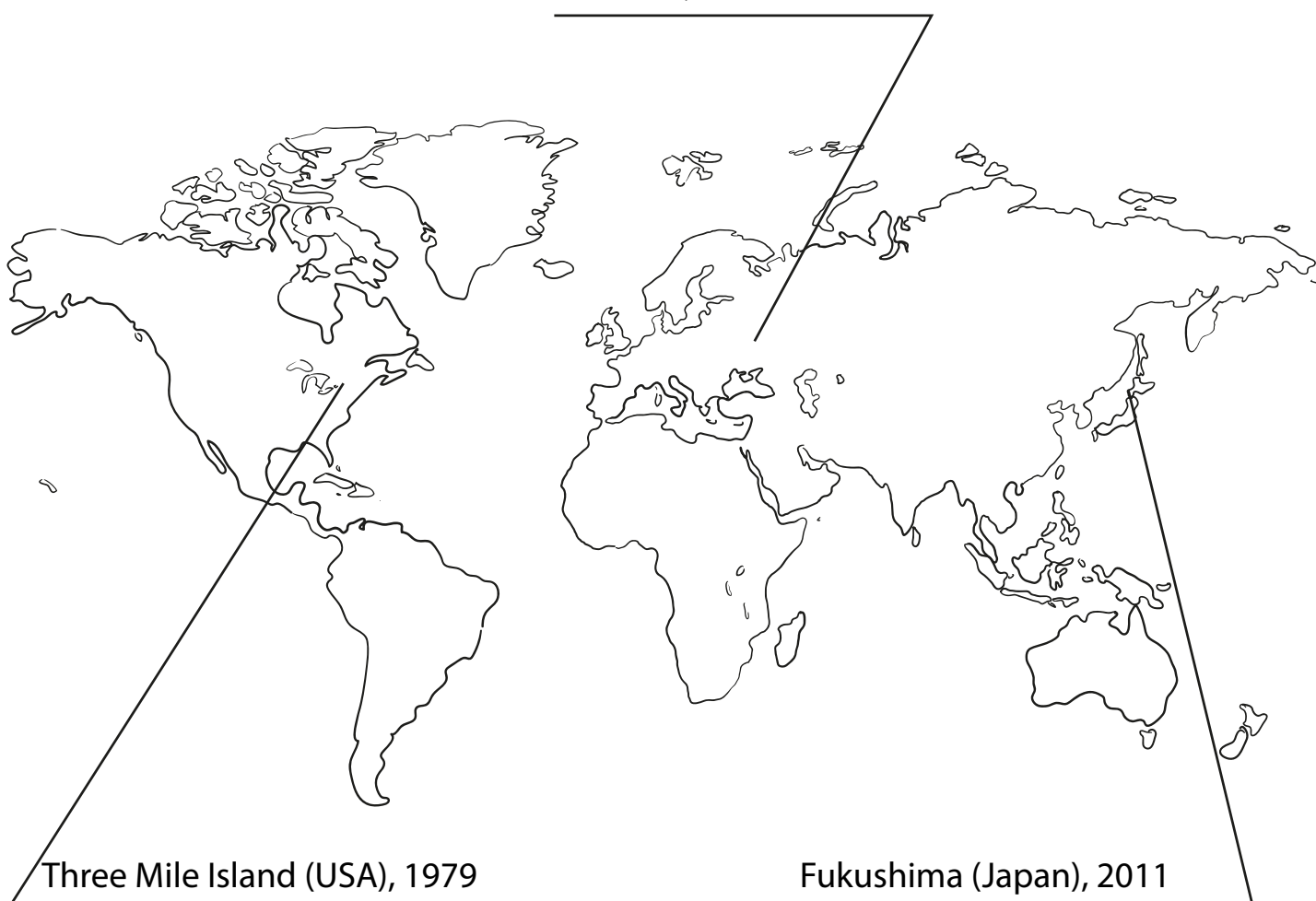
- nuclear power plant failure - nuclear facilities built by most of our close and distant neighbouring countries place us in potential contamination range. The construction and operation of such facilities is closely monitored and controls into the use of radioactive materials are extremely stringent. Regulations minimise the likelihood of emergencies to a minimum, but as in any other situations, failures are still possible. Facility managers are equipped with emergency plans and a range of safety systems to deal with the consequences of an emergency. Remember, it does not take an "atomic bomb explosion" to create a nuclear emergency for a specific site and its occupants
- emergency caused by inappropriate storage of radioactive sources and waste and their use, treatment and disposal
- terrorist activity
- failure to comply with laws and safety procedures
- inadequate technical safeguards used

Examples of nuclear radiation emergencies

- failure in the non-nuclear part of a nuclear power plant;
- accident in the “Maria” nuclear research reactor;
- failure of a power station in a neighbouring country

Historical emergencies

Chernobyl (USSR), 1986



Three Mile Island (USA), 1979

Fukushima (Japan), 2011

The probability of an actual hazard arising from these situations is extremely low, but it still exists. If it does occur, those in the affected area will be informed of the hazard and recommended course of action.

Remember that the occurrence of any of these emergencies is not always an immediate threat to life!

3. The most common effects of a nuclear emergency

The probability of an actual hazard arising from these situations is extremely low, but it still exists. If it does occur, those in the affected area will be informed of the hazard and recommended course of action.

The health effects of exposure to nuclear radiation depend, among other things, on the following:

- duration of exposure
- distance from the nuclear radiation source
- nuclear radiation shielding used
- amount of nuclear radiation absorbed by the body
- type of exposure of the body - external or internal (after penetration e.g. through wounds on the skin, inhalation or ingestion)
- type of nuclear radiation
- weather

At low levels, nuclear radiation does not have an immediate perceptible effect on people. However, it is believed that any exposure to nuclear radiation may increase the probability of developing cancer throughout individual's further life and increases the risk of transmitting hereditary diseases to children.

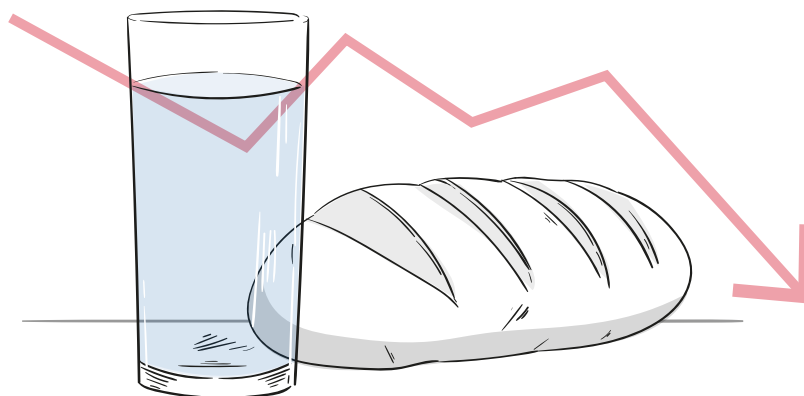
Some people exposed to nuclear radiation may experience Acute Radiation Syndrome (ARS) following high dose exposure. The main signs and symptoms of ARS are nausea, vomiting, diarrhoea and reduced blood cell counts.

Nuclear emergency also brings with it the risk of radioactive substances entering the environment and being airborne over a wide area. Radioactive material will spread with the speed and direction of the wind - the larger the area contaminated, the less active it will be. Safe return to the contaminated area may be possible only after a few or even a dozen of weeks.

Nuclear emergency in the medium to long term perspective involves contamination of land, water and food. In addition, exposure to high doses of nuclear radiation can lead to serious diseases.

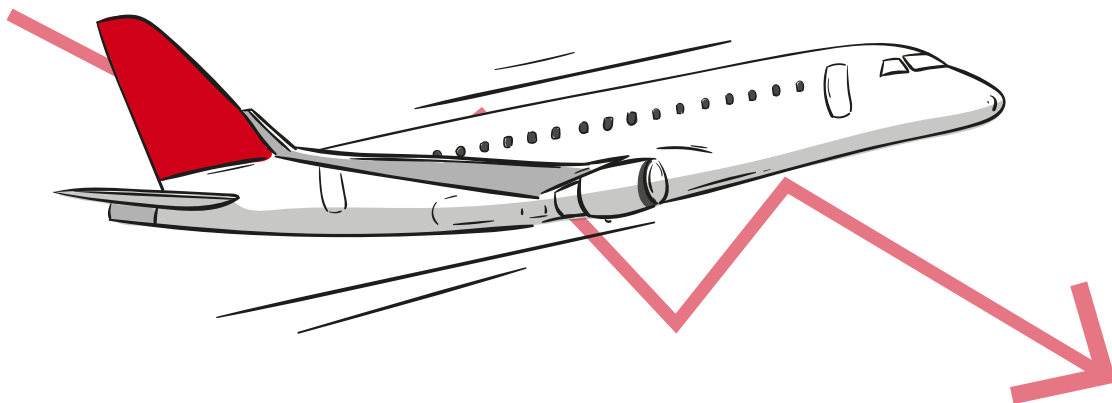
Hazards to people and the environment

- direct hazard to life and health
- damage to health - skin burns, damage to the digestive system, gastro-intestinal, cardiovascular or nervous systems, oncological diseases
- contamination of soil, air, water
- restriction of access to food and drinking water
- temporary traffic obstructions - exclusion of the area
- general panic and disturbance of public order
- negative impact on mental health



Hazards to the economy

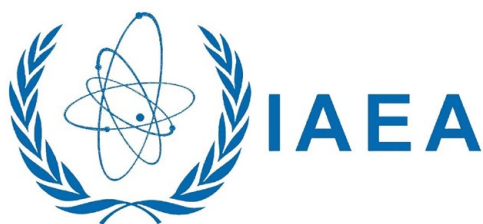
- destruction of livestock and crops on farms
- increase in prices of food products
- decline in sales of locally produced good
- contamination of water supply networks
- long-term blockage of traffic junctions - difficulties in transportation
- long-term decrease in the level of tourist traffic in the region
- difficulties in the operation of hospitals - a large number of people willing to be tested for possible radioactive contamination



4. Detection and monitoring

Measurements of the concentration of radioactive substances are carried out by operators of nuclear facilities and the National Atomic Energy Agency. Monitoring is continuous and the data from the measuring stations are transmitted on an ongoing basis - 24 hours a day. Testing is carried out to ensure that the amount of radioactive material does not exceed specified safe levels.

Poland cooperates in the field of nuclear radiation monitoring with, among others, the International Atomic Energy Agency and the European Commission.



The construction and operation of facilities where nuclear materials are used are closely monitored and controls over their use are extremely stringent. Facility managers are equipped with action plans to deal with the consequences should such situations arise.



5. Safety rules

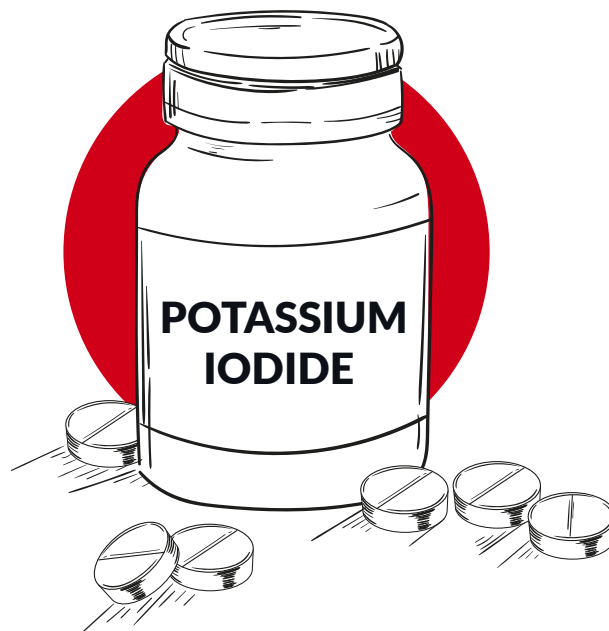
- what to do in the event of a nuclear emergency?

Not all accidents that occur at nuclear power plants result in the emission of radioactive substances. An emergency can be contained within a power plant and pose no risk to people.

However, if a nuclear radiation emergency were to occur on the territory of our neighbouring country, the level of radiation would probably be small, but noticeable over a wide area. Most probably such a situation will not have a negative impact on the health of Poles. Many of us may experience a small but long-term increase in nuclear radiation exposure.

Nuclear emergencies may result in the release of radioactive forms of iodine. In such a situation, state services may recommend taking potassium iodide to protect the thyroid from absorbing dangerous substances (taking stable iodine blocks the thyroid gland and prevents radioactive iodine from being retained in the body, resulting in a reduced nuclear radiation dose).

Despite the low probability of a nuclear emergency, it is worth considering to get prepared for its occurrence and keep yourself and your loved ones safe. How can you do this?

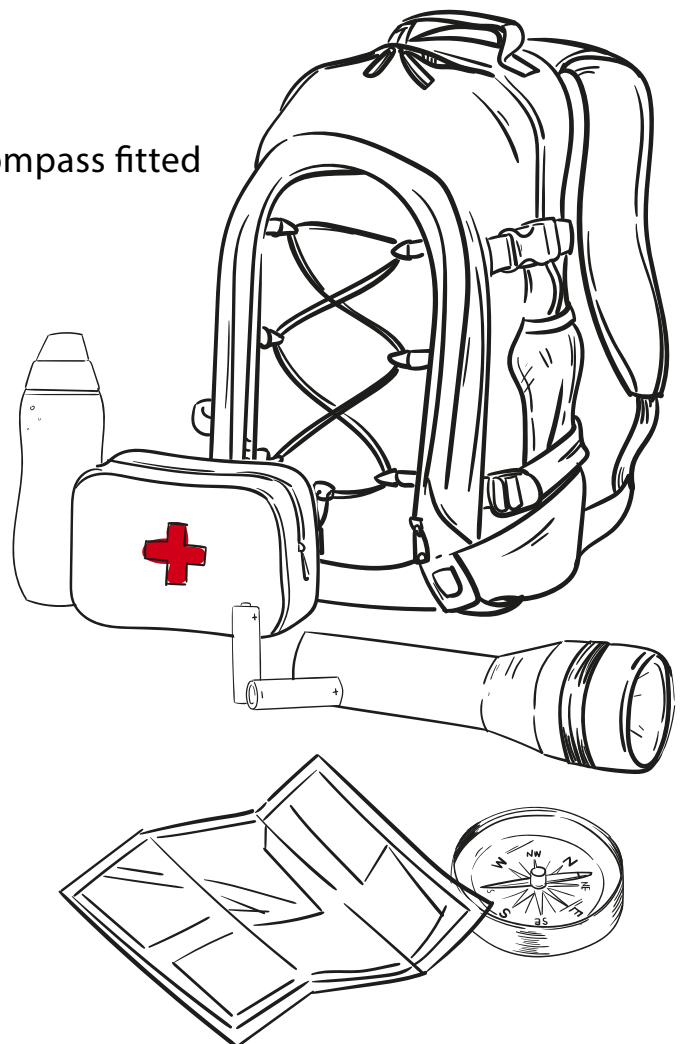


Before the emergency

Preventive measures play a key role in eliminating or reducing possible damage from unforeseen nuclear radiation hazards. It is important that we are prepared for the occurrence of such a situation. How can we do this?

1. Prepare an evacuation rucksack - to save time and to make sure you take everything you need in this or any other emergency, it is a good idea to make sure you prepare an evacuation kit in advance. It should include:

- battery radio + batteries
- torch + batteries
- essential documents
- lighter / matches
- breathing/protective masks
- map with local roads, compass, compass fitted to indicate the azimuth, GPS
- can opener
- meals for 2 days
- knife, pencil and notebook
- cutlery set
- rain coat
- first aid kit
- sleeping bag
- disposal bags
- spare clothes
- soap, disinfectant gel
- pliers, crowbar, multi-tool
- cash in small denominations
- filter bottle with a new filter
- rubber bands, string, cable ties



Each member of the household should have a separate rucksack ready and easy to put on. Since you do not know when you will need access to an evacuation kit, the most sensible solution is to have separate kits at home, work and car.

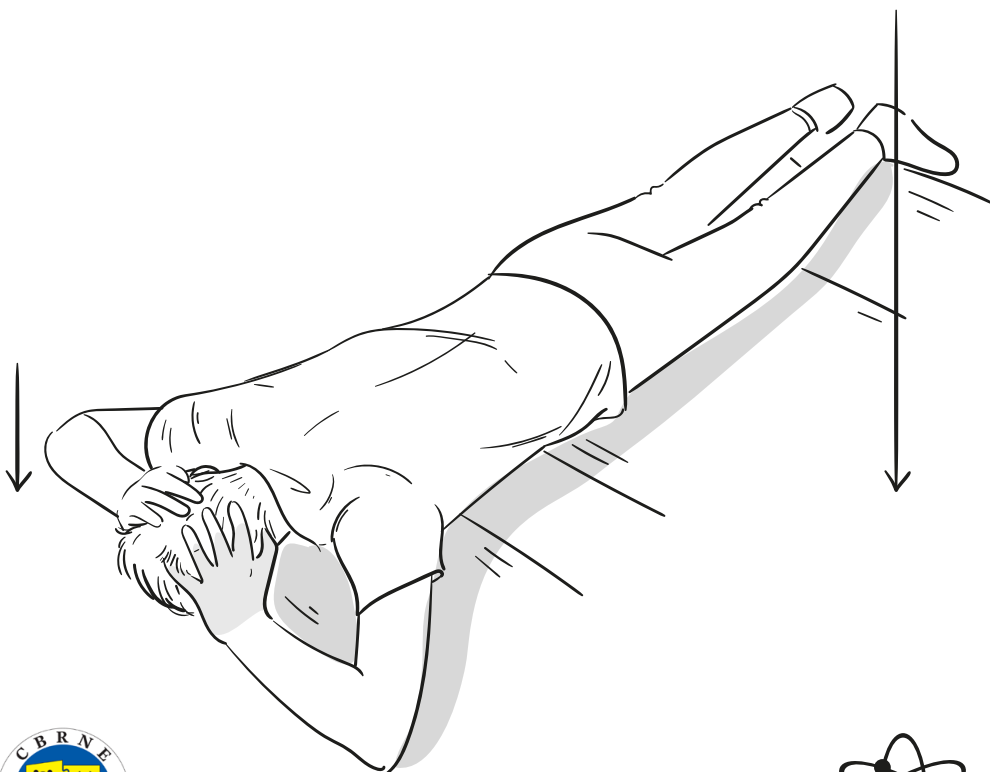
2. Prepare an emergency plan - identify the safest places to go

Think about the best shelter in the places you go to most often (work, school, home). The ideal place to hide from the negative effects of nuclear radiation is one with thick walls and no windows.

If you are warned of an impending emergency (e.g. announcement by state services, RCB ALERT), enter the nearest building immediately and move away from windows. Try to stay in the centre of the room – nuclear radiation decreases with increasing distance from its source. This will help provide protection from explosion and radiation.

If you are in the open air at the time of the emergency (e.g. detonation of a "dirty bomb"), then:

- hide from the explosion behind anything that can provide protection
- lie face down to protect yourself from the heat and falling debris
- avoid clouds of dust



If information reaches you after the event has already occurred:

- cover your nose and mouth and move away “against the wind” from the scene as quickly as possible. Even short distances provide additional protection – the nuclear radiation dose decreases significantly as the distance from the nuclear radiation source increases.
- enter the nearest undamaged building. If possible, take shelter in a basement, shelter room, underground car park or underground metro station
- move away from external walls
- close and seal windows, doors and vents, turn off air conditioning
- keep your emotions in check and don't panic - you will reduce unnecessary oxygen consumption in a closed room
- use the phone only in an emergency - the network will be at risk of overload
- listen to and follow the instructions of the state services



After the emergency

After finding safe shelter:

- take off your clothes and put them in a plastic bag and put them outside
- take a shower - wash yourself thoroughly with soap and water
- if you cannot wash or shower, wipe your skin and hair with a clean damp cloth
- treat any wounds
- do not eat or drink anything that may have been exposed to nuclear radiation
- close and seal windows, doors and vents, turn off the air conditioning
- stay inside the building until you are notified by the services that there is no hazard.

6. Under what circumstances the services shall be called and when to make an emergency call?

If you have information about the possibility of a nuclear emergency occurrence- notify state services immediately.

Call 112 and give details of the emergency (e.g. smoke/fire in the vicinity of the "Maria" nuclear research reactor).



7. Legislation

The most important legislative documents in reference to nuclear radiation issues are as follows:

- The Act of 29 November 2000 - Atomic Law (Polish Journal of Laws of 2021, item 1941)
- Treaty establishing the European Atomic Energy Community, signed in Rome on 25 March 1957 (consolidated version Official Journal of the EU of 2016 C 203 p.1, as amended)
- Regulation of the Council of Ministers of 11 February 2013 on requirements for the commissioning and operation of nuclear facilities (Polish Journal of Laws 2013, item 281)
- Regulation of the Council of Ministers on emergency response plans in case of radiation emergency (Polish Journal of Laws of 2021, item 1086)
- Regulation of the Council of Ministers on intervention levels for various intervention measures and criteria for cancelling intervention measures (Polish Journal of Laws of 2004, item 987)
- Regulation of the Council of Ministers on the types of intervention measures introduced in the external zone and the values of operational intervention levels constituting the basis for the implementation of these measures in the external zone (Polish Journal of Laws of 2020, item 2247)
- Regulation of the Council of Ministers on the stations for early detection of radioactive contamination and on the units that conduct measurements of radioactive contamination (Polish Journal of Laws of 2002, item 2030)
- Council Directive 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom
- Council Directive 2009/7/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations
- Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent nuclear fuel and radioactive waste

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