

**HEALTH PROTECTION GUIDANCE
IN THE EVENT OF
A NUCLEAR WEAPONS EXPLOSION**

INTRODUCTION

Recently there have been increased concerns about the development and possible use of nuclear weapons by certain countries or by terrorists. This document provides advice to the general public on how best to act to minimize any health consequences in the event of a nuclear weapon explosion or if such an event is anticipated. It does not cover advice to staff of aid agencies traveling into the field after such an event, nor does it cover advice in the event of a severe accident or terrorist attack at a nuclear power plant¹, explosion of a so-called ‘dirty bomb’² or other scenarios. Further information on these situations can be obtained from the web sites given at the end of this document.

EFFECTS OF A NUCLEAR EXPLOSION

The effects of a nuclear weapon³ explosion are the blast (damage to or destruction of buildings and those in them), heat (destruction or injury by high temperatures or fire), intense light (damage to eyesight) and ionizing radiation (causing Acute Radiation Syndromes of different degrees of severity). A detonation similar in size to the bomb that was dropped on Hiroshima (15 kilotons) could result in a high damage zone of a few kilometres radius where there would be few or no survivors. There would also be a significant number of injured people over a considerably larger area. However the effects of nuclear explosion generated by the blast could be reduced somewhat by preparation in advance and prompt action during the event.

Detonating a nuclear weapon generates an intense and immediate pulse of radiation, and gives rise to longer lasting radioactive contamination. Objects close to the explosion can

¹ Whilst a severe event at a nuclear power plant could give rise to a release of radioactive material into the atmosphere, a nuclear power plant cannot explode like a nuclear weapon. Advice to mitigate environmental health effects of a nuclear accident can be found in numerous IAEA and WHO publications (see web sites)

² The term ‘dirty bomb’ was coined by the media to describe a radiological dispersion device, that combines conventional explosives, such as dynamite, with radioactive materials in the form of powder or tiny pellets packed around the explosive material. The effects of such a bomb are limited to the conventional blast damage at the site of the explosion and contamination of radioactive materials in the local vicinity.

³ There are different types of nuclear weapons, some of them are neutron bombs. Their biological effects depend a lot on the type of the nuclear bomb.

be made radioactive by neutrons from the explosion, but further away objects become radioactive from fallout of radioactive debris generated by the weapon. The initial “prompt” radiation would directly affect everybody up to a few kilometres, whereas fallout can irradiate people over a much larger area in a number of ways.

A radioactive cloud is spread by the wind, possibly over large distances. Rainfall can wash out some of the radioactive materials from the air and enhance fallout deposits onto surfaces where it has rained. Once this radioactive cloud deposits as particles on surfaces it can be picked up on clothing and other objects or inhaled or spread further. The radioactive fallout can also contaminate food and water supplies if it deposits on crops, animal feed or in drinking water sources. The hazard from this fallout reduces with time but could last for many months or more.

Radioactive materials may be inhaled from the air or ingested in food causing internal radioactive contamination and damaging internal organs of the body. External exposure can be due to radioactive materials deposited on the ground, buildings, or even on our clothes or skin. If radioactive materials come into contact with the skin it may cause radiation burns

Persons near the site of detonation surviving the initial blast and thermal effects would be exposed to high levels of radiation and could develop symptoms of radiation sickness. *Early symptoms of high radiation exposure include nausea, vomiting, diarrhea, fatigue and headache. While thermal burns may appear within minutes, radiation induced skin injury and other early symptoms develop over days and weeks.* Depending on the severity of exposure, victims may experience different symptoms and medical care will be needed. Following years or even some decades after exposures an increased risk of cancer among the wider exposed population could be expected.

There will be considerable damage to the infrastructure of society. Communication systems may be severely disrupted and normal modes of transport may not be available. Consequently there would be great difficulty in providing effective medical treatment to the large numbers of casualties.

PROTECTIVE MEASURES

Protection from the immediate effects of the nuclear explosion is possible by sheltering from the blast, heat, light and shock waves, and then quickly moving to or remaining in well sheltered locations to protect from fallout radiation and keeping away from contaminated areas.

Protection from radiation involves four elements:

- 1) sheltering to reduce direct radiation exposure from fallout outside and inhalation of any radioactive particles; inhalation of fallout can also be reduced by using simple face masks (or scarves or handkerchiefs) that cover the nose and mouth.
- 2) avoiding skin contact with objects contaminated by fallout; remove any initial contamination by changing clothing and washing;
- 3) avoiding eating locally produced fresh foods or drinking from open water sources unless absolutely necessary; and

4) treating open wounds as soon as possible to avoid bleeding and infections.

WARNINGS

If you receive a warning of an imminent nuclear explosion from civilian authorities broadcast by TV /radio, follow the advice given by these authorities.

WHEN A NUCLEAR EXPLOSION OCCURS

If you are near the event at the time (within a several hundreds of meters or few km)

- Turn away and close and cover your eyes to prevent damage to your sight.
- Drop to the ground face-downwards and place hands under your body.
- Remain flat until heat and two shock waves have passed.

If outside during the blast

- Improvise a covering for your mouth and nose with a headscarf or handkerchief.
- Remove any dust from clothes by brushing, shaking and wiping in a ventilated area covering your mouth and nose while doing this.
- Move to a shelter, preferably located away from the direction that the wind could be taking the radioactive material. Go to a basement or other underground area.
- Remove contaminated clothing, if possible take shower and change clothes prior to entry.

If already in a shelter

- Stay calm, avoid panic
- Cover your mouth and nose with either a face mask or an alternative material (e.g. scarf) for the initial period of fallout
- Prevent entry of radioactive dust by shutting off ventilation systems and sealing any doors or windows, although maintaining some filtered air flow for breathing
- Stay inside until authorities say it is safe to come out
- Listen to the local radio or television for further advice
- If you must go out, cover mouth and nose with a damp towel. Be prepared to evacuate to an unaffected area or shelter in your home
- Await further contact. Note that communications will be severely restricted.
- Use stored food and drinking water
- Do not eat local fresh food or drink water from open water supplies
- Treat (clean and cover) open wounds

If advised to evacuate

- Listen to radio or television for information on evacuation routes, temporary shelters, and procedures
- Close and lock windows and doors
- Turn off air conditioning, vents, fans, and furnace. Close fireplace dampers.
- Take disaster supplies
- Remember your neighbors may require special assistance - infants, elderly people, and people with disabilities

If advised to use iodine prophylaxis

- Iodine prophylaxis (or thyroid blocking with large dose of stable iodine) is usually performed by taking potassium iodide (KI), rarely potassium iodate (KIO₃) tablets
- Taking KI is not recommended unless there is a verified risk of exposure to radioactive iodine as potassium iodide only protects a person's thyroid from exposure to radioactive iodine. KI will not protect a person from other radioactive materials or protect other parts of the body from exposure to radiation)
- If advised by competent national authorities (and announced on the radio and/or TV) KI tablets must be taken as soon as possible to be effective
- There is no need to take more than one tablet per day for protection
- Age dependent dosage should follow the WHO Guidelines published in 1999 [WHO Guidelines for Iodine Prophylaxis following Nuclear Accidents, http://www.who.int/ionizing_radiation/pub_meet/Iodine_Prophylaxis_guide.pdf]

After the Event

When the immediate danger has passed, avoid using foods from your garden or milk from your cows or goats until these can be inspected *and cleared by competent authorities*. Contamination could affect areas over a hundred km from the blast site.

PREPARATION

If there is a credible but non-specified threat of nuclear weapon use in your area, there are a number of prudent preparatory actions that could help you to cope with the immediate consequences should such an explosion occur:

- If there is a consistent heightened risk of use of nuclear weapons, consider leaving the area
- Identify and be aware of possible shelter areas. The best are solid shelters such as cellars and inner rooms of solidly constructed buildings (concrete), or caves and tunnels

Have disaster supplies on hand:

- Accumulate supplies of food and drinking water (at least 2 litres per person/day) for a few (3-5) days. Keep emergency food (canned) and water (bottled)
- First aid kit and manual; respiratory protection e.g. face masks to protect against inhalation of radioactive dust
- Essential medicines, your usual medical supplies for a week
- Tablets of stable iodine (preferably 65 mg KI per scored tablet, packed in aluminium foil by ten per box) is reasonable to keep at home. One box is sufficient for a family
- Flashlight (torches) and extra batteries
- Portable, battery-operated radio and extra batteries
- Spare clothes, shoes, hygienic supplies
- Cash and credit cards

You may need to be prepared to spend a number of days in the shelter, before you are advised to come out or could be rescued. About 50% of the radiation dose comes from short-lived high activity radioisotopes that decay in a few days.

Further information:

World Health Organization

Radiation and Environmental Health Unit
http://www.who.int/ionizing_radiation/en/

WHO/REMPAN Collaborating Centers and Liaison Institutes -
http://www.who.int/ionizing_radiation/a_e/rempan/en/

Emergency Control Centre
Tel: +41 22 791 3427 and +41 22 791 4312, Fax: +41 22 791 4123
Email: EMERCON@WHO.INT

International Atomic Energy Agency

E-mail: Official.Mail@iaea.org
<http://www.iaea.org/>
<http://www-rasanet.iaea.org/home.htm>
http://www.iaea.org/worldatom/Press/Focus/RadSources/Radiolog_devices.html
- http://www.iaea.org/worldatom/Press/Focus/Nuclear_Terrorism/

U.S. Nuclear Regulatory Commission

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dirty-bombs.html>

U.S. Center for Disease Control and Prevention

<http://www.bt.cdc.gov>