

# **Sheltering in Place in the event of release of a chemical agents**

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## **1. Background**

The likelihood of emergencies arising in countries in which we conduct humanitarian operations is a fundamental concern for personnel health and safety. A particular concern is a Chemical incident. Although it is not envisaged that humanitarian operations would be conducted in chemical environments, personnel should still be prepared for unexpected events and understand both evacuation and shelter in place procedures. The guidance below provides information on what to do in case of an unexpected chemical event. This guidance will focus on the signs and mitigation measures that it's possible to undertake in case of a chemical release.

Some of these chemical agents are designed to cause severe damage that eventually can lead to death. Other agents are designed to give you blisters on the skin. It is therefore essential that you react quickly and appropriately to reduce your risk of exposure. Besides leaving the area that is contaminated, the next step you need to do is to protect your airways and cover any exposed skin.

Time is essential – the faster you react and protect yourself, the higher the likelihood that you can survive an exposure.

## 2. What to be done if a release occurs.

- Stay alert for warning signs. Early detection enhances survival
- Move crosswind from the source of the agent
- Move until you're sure to be out of the contaminated area (the signs to notice are listed below)
- Contact your local office as soon as possible (this must not delay you removing yourself from the immediate area)
- Do not return to a possible contaminated area until UNDSS (or other UN/international agency) has declared it safe
- If movement out the area is not possible, move to the nearest – "Shelter in place" location

Listed below are four examples of what to do in case there are signs of a possible chemical release.

For all of these options it must be stated that if the signs are identified within a timeframe where escape from the area is possible, then this should always be the priority.

By moving diagonally, you minimize the time spend in a contaminated area. Moving up or downwind is only to be undertaken if the situation requires it (for example getting to a safe house within a short distance) or it's the only way of escape.

### Guidance – Walking/Working

- Run diagonally (from the point of release) out of the contaminated area or get to nearest known shelter in place.
- Report to Country Office (CO), providing a basic assessment of the incident.
- Do not return to the contaminated area until CO clearance is provided.

### Guidance – Driving

- Close all doors and windows. Switch off ventilation and/or Air Conditioning.
- Drive away from the incident, if possible diagonally from the point of release.
- Once out of the contaminated area, pull over and get out of the vehicle (it could be contaminated).
- Report to Country Office (CO), providing a basic assessment of the incident.
- Do not return to the contaminated area until CO clearance is provided.

### Guidance – Confined in-house

- If outside, move indoors and upward to an interior room on a higher floor, if possible. Remember many agents are heavier than air and will tend to be closer to the ground.
- Once indoors, close all windows and exterior doors; shut down air conditioning or heating systems to prevent circulation of air. If possible follow the shelter in place guidance.
- Report to Country Office (CO), providing a basic assessment of the incident.

### Guidance – office

- go to the pre-identified assembly area (internal room which has been already selected for this purpose)
- follow the shelter in situ guidance, ensuring that air entry is closed off as soon as possible

### **Note.**

If the possibility of evacuation or shelter in place is not immediately possible the option of a shower, drying off with a clean towel and clean clothing when available, will have some impact on the level of contamination on you.

### **3. What is sheltering in place?**

Shelter in place is a process for taking immediate shelter in a location readily accessible to the affected individual by sealing a single area (an example being a room in a house or office) from outside contaminants and shutting off all air conditioning systems (see the table at the end of this document for a list of suggested equipment items). It is intended to be a temporary measure to minimise exposure to harmful levels of chemical agents. It is an emergency measure of last resort where exposure is not foreseen in sufficient time to allow evacuation to be undertaken without the risk of exposure to harmful levels of chemical agents. It is designed to “buy time” for those sheltering during which a safe evacuation can be planned and conducted or to allow the outside concentration of chemical agents to fall below levels immediately dangerous to life or health. It should not be seen as a base from which operations can be safely conducted in a contaminated environment.

### **4. When to shelter in place**

Depending on the weather (sunshine, rain, temperature etc.) and the type of chemical agent the contamination will be more or less persistent. Common to all chemical agents the vapours will be at some point be diluted in air. This is why it is important to get away from the contaminated area quickly. Sheltering in place should be undertaken in circumstances of sudden outdoor release or suspected release of chemical agents where it is not possible to safely evacuate the affected area (see indicators of release below).

### **5. For how long should sheltering in place be undertaken.**

Sheltering in place is designed to be a temporary measure to avoid exposure to high concentrations of chemical agents. However, even with a well prepared and constructed improvised shelter, chemical agents will eventually penetrate the shelter. As soon as the indicators for clear air outside (see indicators below), people should move out of the shelter.

### **6. Constructing an improvised shelter**

#### **6.1. Location of the Shelter**

Wherever possible the shelter should be located:

- in a room large enough to accommodate all those who are required to take shelter (this is important to ensure there is sufficient air in the room to prevent build up of dangerous levels of exhaled carbon dioxide);
- above ground level but not on the roof (note that it should never be located in a basement as many chemical agents are heavier than air and tend to concentrate in basements and cellars);
- in the centre of the building, ideally with no windows or as few (well fitting) windows as is possible;
- in a room with substantially constructed walls and a well-fitting, preferably lockable door; without vents or air conditioning ducts leading directly to the exterior of the building.

## 6.2. Construction of the Shelter

The aim is to create a room where the exchange of air with the outside environment is minimised as far as is possible. The room should be prepared for use in the following manner:

- ensure all windows are tightly closed and if possible locked;
- if necessary to reduce the possibility of the window shattering, place tape crosses on windows;
- if there is sufficient material available, line the inside of the room with an impermeable liner, such as polythene sheeting secured in place with duct tape. When lining the inside of the door, leave extra sheeting to overlap the lining on the wall which can be taped closed once the room is sealed;
- if there is insufficient material to line the entire room then ensure that the windows and doors are lined with impermeable sheeting, secured in place with duct tape;
- ensure methods of communication with the outside world, if possible using several methods e.g. land line, mobile telephone, satellite telephone and two way radio;
- pre-stock the room with a change of clothing, large heavy duty plastic bags and adhesive tape to allow the removal and sealing into plastic bags of any potentially contaminated clothing;
- ensure a supply of adhesive wound dressings to cover any cuts or breaks in the skin to minimise ingress of agents;
- ensure a supply of buckets, water, soap solution, wipe cloths and towels sufficient for all those who may have been exposed to undertake emergency self-decontamination along with extra towels and water to act as an additional seal at the foot of the door way;
- ensure a source of emergency lighting, such as torches or battery powered lanterns.
- Make sure to have a stock of miscellaneous items e.g. prescription medicines and eyeglasses, extra blankets, passports and other important documents.
- Warning: while indoors in a sealed off space do not use any type of stove or heater that uses coal, wood or gas, as there will be a higher risk of carbon monoxide poisoning from the incomplete combustion of the fuel due to limited oxygen supply.

## 6.3. Procedure for Sheltering in Place

Immediately upon suspicion or confirmation of a release a chemical agent (see indicators of release below) a decision must be taken as to whether an evacuation can be conducted without exposing yourself to unacceptable danger. This will include factors such as the proximity of the building to the confirmed or suspected release, the amount of agent released and other factors such as the general security situation, the availability of vehicles and the ability to move. If it is deemed unsafe to evacuate then the following procedure should be followed:

- gather all personnel/family members together ensure that everyone is accounted for and inform them of the decision to shelter in place
- inform those not present of the decision to shelter in place and advise them not to return (telephone or radio)
- close all doors and windows, lock and secure the building as far as is possible
- turn off any air conditioning or ventilation fans etc
- move to the pre-constructed shelter, close the door once everyone is inside
- seal the overlapping material lining the door with that lining the wall with the duct tape
- place damp towels at the bottom of the door to reduce the air entering under the door
- **anyone showing any signs of exposure to agent should immediately remove all clothing, wash using the soap and water, dry themselves with a towel, and put on clean clothing then seal the removed clothing and used 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
- contact the pre-arranged contact person and inform them of the instigation of the sheltering in place arrangements
- await further instructions

Do not eat or drink in the early stage of a possible release. Avoid contact between your hands and face to minimise the possibility of inadvertent intake of chemicals which may be on your hands. If water is necessary at some point, only drink bottle water. Once one bottle is open and you're finished drinking, put the lid back on. The bottle is then considered contaminated and should not be reopened.

#### **6.4. Stand Down from Sheltering in Place**

Sheltering in place is intended as a temporary measure to reduce the potential for exposure to harmful levels of chemical agents. However, without specialist collective protection facilities, the time for which sheltering in place can be maintained is limited. This is due to the following reasons:

- all improvised shelters will allow some ingress of contamination - after a period, the concentration of contamination inside the shelter is possible to equal or exceed that outside the shelter;
- 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 time, depending on the size of the room and the number of people in the room.

Sheltering in place should therefore be limited to as short a duration as possible unless extreme circumstances prevail (for example, an on-going bombardment, which makes 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 specialist detection and monitoring equipment, some indicators that the concentration of agent has fallen below levels immediately dangerous to life and health may include:

- indications that people have returned to the area (e.g. voices or traffic noise);
- signs of the presence of animals (bird calls, barking dogs, etc);
- Information from external sources such as local radio broadcasts or information via telephone or two way radio from external contacts.

Until these signs occur or other signs clearly indicate that there is no contamination in the air or UNDSS/FSO has stated so, the shelter is not to be left. Once a decision to leave the shelter has been taken, people should monitor each other for signs of exposure to chemical agents. If any signs are observed, they should immediately return to the shelter and carry out the procedure for entry as outlined above.

If a decision is taken to attempt a rescue of those sheltering in place, this will be communicated along with the procedure to be followed.

#### **7. Indicators of possible release of chemical agent**

Detection of chemical warfare agents such as the release of the nerve and blister agents are difficult without specialist detection equipment. However, the following points may give an indication of a release of agent:

The following are signs or combination of signs that are most likely to occur should a chemical release incident take place:

- Victims suffer from nausea, breathing difficulty, convulsions and/or disorientation.
- Birds and insects drop from the sky.
- There are an unusual number of dead or dying animals or insects.
- There are low-lying clouds or fog unrelated to weather as well as clouds of dust or particles in the air.
- Unusual droplets of liquid – for example the presence of liquid droplets falling to earth following the low level over-flight of an aircraft;
- The presence of unusual droplets or pools of liquid on the ground – these may have an appearance similar to that of an oily solvent;
- Unusual mists or vapours – most chemical warfare agent is delivered in liquid form which will evaporate at various rates depending on the nature of the agent. Some of these vapours may be associated with unusual odours **however these odours are not always present**

**Table 1: Suggested equipment for construction and stocking of shelter**

ITEM	QUANTITY	PURPOSE	COMMENTS
Heavy duty polythene sheeting	Ideally sufficient to line entire room but as a minimum sufficient to completely cover windows and doors	Prevention of ingress of contamination into shelter	Held in place by tape therefore heavy tarpaulins are not suitable
Heavy duty adhesive tape	Sufficient quantity to secure polythene sheeting in place	Securing in place of polythene sheeting Sealing of bags for removed contaminated clothing	
Tuff cut safety scissors	1 pair	Cutting polythene sheeting and adhesive tape	Must be safety type scissors to avoid puncturing of bags or sheeting
Heavy duty large polythene bags	2 x number of people the shelter is designed to accommodate	Bagging and sealing of contaminated clothing	Removed clothing should be double-bagged and sealed using the "swan neck" method
Clean water	Sufficient to allow thorough decontamination of all those using shelter if required	Decontamination washing – for use with soap and wipe cloths	Not to be used for drinking Ideally this should be stored in a sealable container to prevent contamination by a chemical agent prior to use
Soap solution	Sufficient to allow thorough decontamination of all those using shelter if required	Decontamination washing – for use with water and wipe cloths	Liquid soap in a dispenser is preferable to soap bars as it reduces the potential for cross contamination
Disposable wash cloths	Sufficient to allow thorough decontamination of all those using shelter if required	Decontamination washing – for use with water and soap	Cloths should never be used by more than one person to avoid cross contamination risk To be disposed of in bag along with contaminated clothing
Disposable towels	2 per person - Sufficient to allow thorough decontamination of all those using shelter if required Addition towels to seal along the bottom of the door if required	Individuals undertaking decontamination should stand on a clean dry towel to soak up any excess water which may run off  One towel per person is used to dry off any liquid following decontamination	Cloths should never be used by more than one person to avoid cross contamination risk To be disposed of in bag along with contaminated clothing
Replacement clothing	One set for each person intended to use the shelter	To provide modesty and prevent possible hypothermia following removal of clothing	Can be temporary disposable clothing or personnel members own clothing placed in shelter in advance of suspected release of agent