HERCA

Heads of the European Radiological protection Competent Authorities

Emergency Preparedness

Practical Guidance – Practicability of Early Protective Actions

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Contents

Introduction

It is essential to prepare the early countermeasures, because in the case of an accident the time will be short to introduce them. Emergency plans have to be developed for each nuclear facility separately. The plans have to be exercised regularly. If emergency plans are published e.g. by putting it into the web, confidential parts (telephone numbers, etc.) have to be eliminated.

To support the development of emergency plans and to react in a proper way in the case of an accident the group give special guidance on implementation of sheltering, evacuation and thyroid blockade in annex 3, 4 und 5. These protective measures have to be taken into account when a significant amount of radionuclides have been released into the environment. In this case it has to be expected that the derived emergency reference levels in food and feed by the EC will be exceeded in much wider area. This means sheltering, evacuation and thyroid blockade have always to be accompanied by banning contaminated food and feed.

The practical guidance cover the definition, the aim and the rationale of the three early countermeasures. They give guidance for the planning phase, the intervention and lifting of the protective actions. The limitation and possible complication of the actions are discussed as well as risk/benefit consideration and linked actions. The tasks of the authorities are clearly indicated.

Practicability of protective actions: Sheltering

Contents

1 Definition ("What is sheltering?")

Sheltering is an urgent protective action in case of an accidental release of radioactive materials in the atmosphere, which means that population is recommended/ordered to go inside and remain indoors (at home, at work, in school or in any other building) for a definite period of time (a few hours to two days). Like for other urgent protective actions, decision about implementation and lifting of sheltering is to be taken by the authorities.

When sheltering is recommended or ordered, the population in the concerned zone is asked to:

- go into or stay inside a building;
- close the doors and the windows and switch off, if possible, ventilation systems;
- listen to the news in radio, TV or other specified means.

2 Aim ("What is the goal of sheltering?")

The aim of sheltering is to reduce the exposure of population caused by external radiation and inhalation to avoid deterministic health effects and reduce the risk for stochastic effects. Sheltering is relevant especially in the early phase during the passage of a radioactive cloud. Children will be the most vulnerable group. To be effective, the protective action should be recommended/ordered in the very early phase of an accidental radioactive release, whenever possible just before the contaminated air arrives. If followed strictly and in time, contamination to skin and to clothes can be avoided or reduced as well as the transfer of radionuclides into buildings by contaminated shoes can be prevented. Sheltering can also be recommended/ordered as an administrative countermeasure e.g. to prepare for evacuation.

3 Rationale ("Why should sheltering be implemented?")

After the declaration of a radiation emergency, sheltering should be implemented as a precautionary protective action before the release, or in actual radioactive releases. As a stand-alone protective action, sheltering should be recommended or ordered in any situation when the released radioactive material is composed by noble gases and/or short-lived radionuclides, or when the projected radiation doses are relatively low. In general, sheltering should be accompanied by other protective and/or linked actions (see paragraph 8).

Offering a temporary isolation against the penetration of outside contaminated air, sheltering reduces the activity concentration in the breathable air and thus exposure by inhalation. Moreover, sheltering provides shielding against external radiation from radioactive material present in the air or deposited on the soil and other surfaces. The shielding effectiveness depends on the type of shelter (concrete and bricks buildings are more efficient than wooden and prefab constructions; large houses are often more efficient than small houses, and a car offers only very limited shielding), on the isolation degree of the building and on the location on the shelter place relative to the outside walls and roof. Sheltering effectiveness depends also on the need for allowing the necessary air renewal for the occupants. The effectiveness to reduce airborne activity concentration decreases with the increase of release duration, as equilibrium tends to be achieved between the pollutant concentration in the outside and inside atmosphere.

Sheltering is very effective in case of a short release (a few hours), because the exchange of air between outside and inside the buildings is considerably reduced. For releases which last a few hours, inhalation doses can be reduced by a factor up to about 3 in typical residential buildings. As reduction factors usually strongly diminish with longer sheltering times, other

protective actions, e.g. evacuation, should be taken into consideration in case of a prolonged release, in particular for more than 24 hours. External radiation can be reduced by factors from about 10 in the inner rooms of detached houses up to several 1000s or more in the cellars of large flat blocks.

During sheltering the population have to be informed about the radiological situation and have to be advised what to do during the accident via the radio or other specified communication channels. Sheltering gives the opportunity to provide or receive information, to prepare further actions, to stop all unnecessary activities and to concentrate on the management of the risk for oneself, the family, the neighbourhood. Possibly, it can be used to prepare the evacuation of population from the affected area.

Sheltering is a practicable short-term alternative to evacuation when evacuation is not possible or considered too risky.

4 Criteria for introducing sheltering ("What is the intervention level for sheltering?")

Intervention dose levels for sheltering have to be taken into account as well the as integration time and the exposure pathways to consider which are commonly direct radiation and inhalation in the early phase. The ingestion pathway does not have to be taken into consideration because it is assumed that warnings against consumption of food and feed which might be contaminated in the wider area will be issued.

5 Practical implementation ("What are the tasks, actions and instructions of responsible authorities before and during the intervention?")

5.1 During planning phase

5.1.1 Tasks of the authorities

- Sheltering has to be planned and prepared carefully in the vicinity of nuclear installations. To be effective in an emergency, local information and arrangements are essential to improve the preparedness for sheltering (e.g. the dose reduction factors for shielding and air exchange should be evaluated for the buildings to consider).
- Stakeholders should be involved in the planning phase to develop the optimised plan, to gain societal acceptance, to prepare themselves and to make sure the plan can be implemented effectively in case of an accident.
- The public should be periodically informed about the purpose and the dose reduction mechanisms of sheltering (see paragraph 0 below).
- It should be made sure that emergency plans of schools, companies, and other institutions in the planning area are established, regularly exercised and tested. The following should be verified:
  - The availability of dedicated places for sheltering; the shelters should be centrally located or in basement, should have as few windows as possible and should be large enough (at least 1 m^2 of floor space per person, in order to prevent dangerous increase of carbon dioxide for 5 hours) for assembling a certain number of people; an estimation of the number of people who have to be sheltered should be made in advance; the shelters should be provided with

radios/TV means, other communication means, with access to water, supplies (food supplies, water supplies, medicine supplies, flashlights and batteries);

– The availability of instructed persons (employees) who will take care in an emergency for closing all heating, ventilating and air-conditioning systems, for instructing the people where to shelter and what to do, for registering the people that are sheltered, for communicating with local emergency authorities, and for instructing the people when sheltering is lifted;

– The staff (including emergency workers, teachers, people in charge of safety tasks in companies and public places etc.) has to be educated and regularly trained for their duties. Periodically, their emergency plans have to be checked and if needed revised.

- Sheltering should be exercised with the staff and the public.

5.1.2 Instructions for population

Planning for sheltering at home, people should be instructed and inspired to:

- choose a centrally located room or basement, that has as few windows as possible; the room (or rooms) should have, at least, 1 m² of floor space per person in order to provide sufficient air to prevent carbon dioxide build-up, and access to a water supply and sanitary commodities;
- the room shall be equipped with communication means (battery-operated radios, telephone or cell phone), other supplies (a prepared sheltering kit including medicines, mineral water, food, pet food, baby formula, diapers, flashlight and batteries), games, books, and other entertainment for making pleasant activities during the sheltering period;
- when having pets, a special place should be arranged for them too; pets should not go outside during a radiation emergency because they may track radioactive materials from fallout into the shelter; preparing a place for pets will keep the radioactive materials from getting inside the shelter;
- be sure that they have the relevant information on sheltering plans from their workplaces, the children's schools, nursing homes where they may have family and from the local town or city officials;
- during exercises, determine whether they can hear sirens and/or see warning lights from home;
- develop their own family emergency plan so that every family member knows what to do; this should be practiced regularly:
    - know what to do in case household members are separated;
    - know what to do if a family member is injured or ill;
    - know what to do in the circumstance that authorities advise you to shelter-in-place;
    - know how to take care of own pets; plan what to do with the pets if going for sheltering in a public shelter where pets are not permitted;
    - know the emergency numbers (fire, police, ambulance, etc.).

5.2 During intervention

5.2.1 Tasks of the authorities

When sheltering is recommended/ordered, some basic items are of importance for the authorities:

- Sheltering (incl. starting time and duration) has to be communicated as early as possible in order to give people enough time to implement the measure.
- The authorities have to stay in contact with the emergency task forces deployed in the field and to guide the staff efficiently during an accident.
- The authorities are obliged to stay in contact with the public affected by this protective action and provide them with all relevant information. The information should be distributed over all possible information pathways like radio, TV, internet etc.
- The authorities have to establish an information centre where people can call and get urgent information, advices, help etc. The staff should be trained to talk to concerned people. This means psychological experiences should be available.
- The public has to be informed periodically about the situation in the plant, especially if a major release is imminent or already ongoing. In such a situation, people should be informed not to go outside except in case of a medical emergency.
- Special instructions have to be given to schools and nurseries. In particular, the school staff must be informed about feasible communication channels with parents and possibilities to get supplies for eating, drinking and accommodation as well as medical support for children in need in case of longer sheltering duration. Advice on how to carry out the duties for supervision and care in case of a sheltering situation together with instructions how to deal with children and/or parents who deny sheltering should be given.

5.2.2 Instructions to be given to the public

Before the release (threat phase), the following instructions should be made to the population in the concerned area:

- bring children and pets indoors immediately; if children are at school, do not try to bring them home unless told to; the school will shelter them;
- close all outside doors and windows;
- turn off the ventilation or air conditioning system;
- close open fireplaces if possible;
- get your emergency sheltering kit and make sure the radio is working;
- listen to the radio or other media to be informed about the situation;
- follow the recommendations given via the media and pay attention to possible calls by loudspeaker on behalf of the local authorities;
- avoid any stay outside; only if urgent tasks or duties have to be performed, it may be acceptable for adults to leave their homes for a short time;
- use the telephone only in the event of an urgent need in order not to overload the lines.

The following recommendations could be made to the population concerned:

- Except explicit contrary instruction, the tap water and provisions stored inside the buildings can be consumed;
- All food bought and stored inside the buildings before the releases can be consumed without any restrictions.

During the release phase (acute phase) when the radioactive cloud passes the recommendations given above remain valid. Additional recommendations concern those who were not able to enter a building before the radioactivity in air increased or who had to leave the building for a short while:

- Remove clothes (at least the outer layer of clothes) and shoes outside the flat or in separate room and place them in a plastic bag to avoid radioactive contamination of your shelter.
- Take a shower and wash the body, especially the parts that are exposed such as hair and hands with soap and water.
- If going outside wear a mouth protection, a cap and gloves.

After the release stopped (post-emergency phase) the recommendation “open windows and doors” should be given as soon as the cloud has passed, in order to exchange the air which might have been progressively contaminated. The following recommendations should be applied:

- open windows and doors, turn on ventilation systems until the building's air has been exchanged with the now uncontaminated air outdoor;
- follow any special instructions given by emergency authorities to avoid chemical or radiological contaminants outdoors.

6 End of sheltering (“When and how should sheltering be lifted?”)

The period of sheltering should end as soon as the radioactive cloud has passed and there is no release threat any more. In the case of a protracted release, sheltering should not last longer than 2 days with a preference for less than 24 hours. The limitation of time is relevant to ensure a highly effective countermeasure. In any case, the options following sheltering are:

- When the intervention levels for relocation are expected to be exceeded:
  - Relocation has to be implemented as soon as possible.
- When the intervention levels for relocation are not expected to be exceeded:
  - Return to normal living with no recommended restrictions on behaviour
  - People are permitted to remain in the area but with recommendations for a modified lifestyle
  - It is recommended to leave the area for less contaminated places (relocation?)

Factors which relate to the choice of decisions to keep the dose as low as reasonably achievable include:

- The received and the projected doses;
- The duration of the release;

- The social acceptability of the protective action (restriction for children to play outside, comfort of the location, perception of the risk by the population, personal situations …);
- Influences on the feasibility to implement succeeding measures (e.g. weather conditions, infrastructural factors);
- To gain/maintain the creditability of the public.

Declaration of lifting should include:

- the reasons for implementation and lifting
- Information about follow-up actions by the authorities
- Advice for personal behaviour.

Analogously, the declaration of prolongation of sheltering should include corresponding declarations.

7 Limitations and complications, and risk/benefit considerations

Benefits:

- Can quickly be implemented for relatively large population groups
- Created order and working space for rescue personnel
- Simplifies follow up evacuation or relocation
- Relatively cheap and can thus be implemented doing little harm in an uncertain situation.
- less disruptive than evacuation,
- less costly than evacuation

Disadvantages:

- Actual dose reduction is uncertain, and in particular in combination with Iodine blockade (if relevant). Efficiency will decrease with increased duration (cf. paragraph 3).
- Families can be told to shelter in different places.

Several difficulties may arise during the implementation of sheltering: missing sheltering places for daily visitors, panic reactions with self-evacuation, bad audibility of the sirens, difficulties with lack of food, medications or care, difficulties linked with isolation, separation from other member of the family, uncertainties about the situation, distrust of the official messages. These difficulties will bring the public authorities to limit, as much as possible, the duration of sheltering, taking into account that an important nuclear accident may result in a release of more than 24 hours.

8 Linked actions

Sheltering (as well as evacuation) will be accompanied by additional protective actions and recommendations:

- Thyroid blocking has to be considered.
- Warnings against consumption of food and feed which might be contaminated in the wider area will have to be considered. The population is strongly advised not to consume fresh vegetables, fruits, meat and milk. The authority will give further information on food restriction as soon as corresponding measurements are available.
- Traffic has to be regulated to control access to the areas of concern.
- Agricultural countermeasures to prevent or reduce a direct contamination of plants and the intake of contaminated feed by animals.

The time during sheltering should be used to prepare future actions:

- Inform the staff concerned by the emergency (situation, risk, protection, control...);
- the elected representatives should communicate the emergency plans;
- Take a census of the staff likely to help and support the populations;
- Take a census of the health staff, likely to take care of or inform the population (doctors and chemists, first-aid workers, firemen, volunteers, reservists of the army, members of humanitarian associations);
- Collect information on the persons needing special care: old, diabetic persons, users of dialysis apparatuses or having a heavy medical treatment, persons having allergies, so as to be able to take care of them if needed, when the protective action will be lifted or the matters to take into account in the event of an evacuation;
- Mobilize, in a precautionary manner, means necessary for an evacuation (interim accommodations, means of transport, washing of vehicles going out of the zone, showers).

Practicability of protective actions: Evacuation

Contents

1 Definition ("What is evacuation?")

Evacuation is an urgent protective action; it is the urgent, temporary removal of people from an area to avoid or reduce radiation exposure in an emergency.

2 Aim ("What is the goal of evacuation?")

The objectives of evacuation in case of a nuclear or radiological emergency are to avoid or minimize effects from short-term exposure by inhalation of airborne radioactivity, by external radiation from the radioactive cloud and external radiation from radioactivity deposited on the ground. If carried out before any release, this protective action will prevent the exposure from radioactivity in air (cloud shine, inhalation) and direct contamination.

3 Rationale ("Why should evacuation be implemented?")

Evacuation is an effective protective action as it moves away the people from the source of exposure. Its efficiency is maximum when this action is carried out as a preventive action prior to any release; it decreases considerably when conducted as a corrective action after the release. Its efficiency further decreases with any delay before it is carried out.

As evacuation is understood as a countermeasure with predominantly preventive character, decision and implementation of evacuation are time-critical and have to rely mainly on predictions, while measurements of radioactivity can only contribute to the evaluation in special cases. Hence, evacuation distinctly differs from relocation and resettlement, as the latter countermeasures address the effects of medium or long-term exposure by external radiation from the ground. Relocation and resettlement are thus not as time critical and decision can be based on comparably extensive measurements in the affected area.

Evacuation conducted after the release reduces the external radiation from radioactivity deposited on the soil and other surfaces, the external contamination due to contacts with contaminated surface or by resuspended contaminated dust as well as the internal contamination by inhalation of resuspended radioactive particles from soil and other surfaces.

4 Criteria for introducing evacuation ("What is the reference level for evacuation?")

Intervention dose levels for evacuation have to be taken into account as well the as integration time and the exposure pathways to consider which are commonly direct radiation and inhalation in the early phase. The ingestion pathway does not have to be taken into consideration because it is assumed that warnings against consumption of food and feed which might be contaminated in the wider area will be issued.

5 Practical implementation ("What are the tasks and actions of responsible authorities before and during the intervention?")

5.1 General considerations on practicability

Evacuation is introduced in the early phase, when sheltering is expected to be insufficient to protect people against unacceptable risks from radiological exposure. It is however considered as one of the most severe and disruptive protective action for the public. Hence decision makers have to consider possible risks and drawbacks resulting from its implementation (e.g. traffic accidents, psychological and economical implications, problems in case of high population density). Therefore, the benefits of evacuation compared to alternative protective actions (in particular sheltering) should clearly surpass its adverse effects.

Because of the complex logistic and management requirements and the hazards associated with evacuation, careful and detailed pre-planning is required which addresses all stages of evacuation.

Evacuation planning is done for a large variety of possible naturally induced or man-made emergencies. Nuclear or radiological accidents constitute a particular class of emergencies. For this class, evacuation planning should be embedded in general concepts for emergency planning. By this, evacuation planning for nuclear or radiological emergencies can take advantage from existing guidance and general provisions. In particular, the stages of an evacuation are not unique to nuclear or radiological emergencies. The stages typically comprise

1. evaluation of the situation and decision to evacuate,
2. alarming and notification of the population,
3. moving the population out of the evacuation zone,
4. accommodation of affected population outside the evacuation zone,
5. re-evaluation of the situation and decision to lift evacuation or to prolong
6. returning of the affected population or transition to prolonged relocation.

As an emergency countermeasure, evacuation typically encompasses durations from a few days up to a few weeks.

As the efficiency of evacuation in nuclear or radiological emergencies critically depends on its timely implementation, especially the time needed for the first three stages needs to be taken into account for decision about evacuation in such an event. Experience from mass evacuations shows that gradual evacuation staggered by partial areas or subgroups of population (called "staggered evacuation" for the remainder of this paper) may be an adequate approach to avoid congestion and stress situations, save time and be able to account for special needs of vulnerable groups (e.g. school children, patients in hospitals, residents of retirement homes, etc.). However, staggered evacuation requires more detailed planning and is dependent on the degree of co-operation and discipline of the population. Practicability of staggered evacuation thus depends on the specific case.

In a nuclear or radiological emergency, it is important whether evacuation is conducted in the pre-release phase, during a release and/or cloud passage or shortly after a release/cloud passage.

5.1.1 Evacuation in the pre-release phase

Evacuation should be preferably carried out in the pre-release phase to avoid any exposure. In this case, however, decision has to be based on rather uncertain predictions of the status within the affected facility, possible releases and development of meteorological conditions. With the proceeding development of the accident, the information basis for decision is expected to improve. However, the available time for implementation and thus the area and the number of people which can be feasibly evacuated will shrink. Thus, the lack or uncertainty of information should not delay the decision to evacuate, even when it is possible that no release is going to happen at all.

Uncertainties in the predictions also involve the risk of a release while people are moving out of the evacuation area. In such a case, exposure might be higher than if people had stayed and sheltered. Nevertheless, discontinuation of the evacuation process would not be a good option in such a case. Rather, the evacuation process should be continued as quickly as possible to minimize additional exposure.

5.1.2 Evacuation during a release and/or cloud passage

During a release, evacuation should generally not be implemented because of the risks of enhanced exposure by the protective action itself (cf. subsection 0) and the uncertainty associated with the movement of the cloud and the determination of endangered and safe areas. In most cases, sheltering during the release/cloud passage phase will be the preferable option.

In special cases, e.g. for prolonged release duration which renders sheltering difficult to maintain over the whole release phase or for areas where sheltering possibilities are practically inexistent (e.g. open air music festival or sport event) or when shelters offer poor protection and removing people out from the affected area can be achieved relatively quickly or if the indication is that the release is likely to become more severe, evacuation during the release/cloud phase remains a justified option.

5.1.3 Post-release evacuation

Evacuation in the post-release phase should be considered if radiation levels from ground shine are so high that short-term exposure by this exposure pathway alone exceeds the reference level for evacuation and doses by ground shine can be efficiently reduced by moving the population quickly out of the affected area.

As significant doses due to inhalation and external radiation from the cloud might have already been received, evaluation should reliably demonstrate that the expected dose reduction by the countermeasure clearly outbalances the adverse effects and risks imposed on the population. Decision should take available measurements of dose rate and of composition of radionuclides deposited on the ground into consideration.

Post-release evacuation differs from relocation which is not as time-critical. Thus, adverse side effects can be avoided by more extensive preparation and relocation is appropriate for lower ground shine levels, as indicated by the corresponding reference levels.

5.2 Practical implementation during the planning phase

Like for other urgent protective actions, decision about implementation and lifting of evacuation must be taken by the authorities.

5.2.1 Tasks of the authorities

- Like other countermeasures, evacuation has to be planned and prepared carefully in the vicinity of nuclear installations.
- Stakeholders should be involved in the planning phase to develop the optimised plan, to gain societal acceptance, to prepare themselves and to make sure the plan can be implemented effectively in case of an accident.
- The public should be periodically informed about the purpose and the dose reduction mechanisms of evacuation (see paragraph below).

The establishment of detailed evacuation plans is a common requirement for off-site emergency. In the following, a brief description of topics which should be included in evacuation planning is given.

- **Decision making and responsibilities**

Appropriate evacuation plans should clearly describe decision making, management and responsibilities in case of an emergency, including

- the determination of the competent authorities to decide about evacuation,
- the description of evacuation management structure including the establishment of a central command structure,
- a clear allocation of roles and responsibilities for the different of tasks associated with evacuation and
- predetermined assessment methods and decision criteria (e.g. tools for decision support, roles of advisors, checklists).

- **Location and extension of planning zones for evacuation**

Evacuation planning is usually based on predetermined planning zones. The establishment of planning zones should on the one hand consider the possible radiological consequences of a major credible accident and on the other hand the possible extension of areas which can be feasibly evacuated in a reasonably short time. Determination of planning zones would thus particularly take the following aspects into consideration:

- The ensemble of accident scenarios which could lead to radiological consequences that may necessitate evacuation, except for extremely unlikely scenarios,
- the location and extension of areas which may be affected at the same time by a particular accident,
- the extension of areas in which evacuation can be implemented and completed in time, taking into account that areas with the highest radiation risk should be evacuated more quickly.

A subdivision of planning zones according to distance from the facility is suitable to distinguish between nearer sub-zones with higher risk and thus more urgent need for evacuation (e.g. where severe acute effects cannot be excluded) and those with lower risk. Contiguous parts of communities should be located in identical sub-zones such that evacuation planning in each part will be based on identical foundations. Further subdivision of each sub-zone into sectors may be advantageous to account for the meteorological influence on location and extension of endangered areas and to facilitate the consideration of staggered evacuation.

- **Evaluation of evacuation scenarios**

Within the planning zones, a representative variety of evacuation scenarios should be considered, taking into account

- the population structure (e.g. living population, working population, schools, hospitals, jails, retirement homes and other institutions with special need groups) including diurnal and seasonal influences on population distribution,
- the traffic infrastructure and transport availability (private, public) within the planning zones including possible bottlenecks,
- background traffic and movement within the planning zone at the onset of an emergency,
- possible needs for additional transport capacity to be brought into the area,
- typical times for warning information and preparation of population according to different warning and communication concepts,
- additional factors which might influence evacuation times (e.g. congestion by unorganized self-evacuation, time for alerting, preparing and moving emergency services to their task locations etc.),
- special externally induced conditions which can influence evacuation progress and bear specific risks (e.g. bad weather conditions, health factors on evacuees etc.).

An assessment based on these considerations should evaluate evacuation times for different scenarios. For such assessments, a variety of numerical models is available. Based on the results of scenario analysis, transport means can be optimized as well as warning and communication systems. Moreover, the use of different approaches (e.g. total vs. staggered evacuation of a given area, choice of transport means, establishment of requirements for public transport) can be tailored to the given specific situation. The identification of possible weak points in infrastructure can lead to necessary and efficient improvements (e.g. needs for road capacity of designated evacuation routes, necessary measures to eliminate or circumvent bottlenecks).

- **Means to alarm and inform the population**

The evacuation plan should describe how the population is warned and informed in case of the decision to evacuate. This includes the requirements for implementation and maintenance of proper warning and information systems, provisions for redundant use of communication systems, arrangements for multilingual communities if necessary and pre-formulated messages.

- **Infrastructure and transport means**

Based on the evaluation of different scenarios, evacuation plans should properly describe

- requirements for movement capability based on private and public transport resources,

- location of collecting points for moving out of the area by public transport,
- gathering and transport arrangements for population groups with special needs,
- gathering and transport arrangements for special institutions like schools, nurseries, hospitals, jails, retirement homes etc.,
- evacuation routes for private cars and receiving communities in safe areas, taking into account the influence of weather conditions on affected areas and preferable evacuation routes,
- provisions for traffic control,
- procedures and personnel capacities for assisting in case of traffic accidents, breakdowns, health emergencies and other non-radiological hazards associated with the evacuation process,
- provisions for access control to and from the evacuation zone, monitoring of contamination at control points,
- provisions for dealing with unorganized self-evacuation (e.g. flexible traffic control procedures, predetermination of receiving areas).

- **Reception, monitoring and decontamination of evacuees**

In order to take care of evacuees outside the evacuation zone, emergency care centres (ECC) should be established in the receiving areas. Their main objective is to provide first advice and treatment to a large number of individuals within a short time. When evacuation was performed during or after the release ECC should also perform contamination monitoring and (if needed) decontamination of evacuees. By this, ECC can also contribute to keep hospitals and other medical institutions free for treatment of serious injuries. The major tasks from of ECC from the medical point of view are

- Contamination monitoring,
- decontamination,
- first medical aid,
- examination and advice to affected people with respect to follow-up medical treatment,
- transfer to further in-patient and out-patient treatment if necessary.

At the same time, ECC should provide means to provide general support to evacuees, including

- provisions to register evacuees,
- advice concerning accommodation facilities in receiving communities,
- first advice and support for other social and psychological needs,
- arrangements to reunite families which have not been evacuated together.

The planning of ECC should be backed by general planning for accommodation and support for evacuees in the receiving areas.

- **Access control to and from the evacuation zone**

Feasibility of access control to and from the evacuation zone will be limited by the number of possibilities to enter and leave the area and population density within the area. At the main entry/exit routes, provisions for the establishment of check points could be considered. Such

check points could especially be used to restrict access to the area for both safety and security reasons. They can also provide means to provide first checks for contamination of vehicles leaving the area. However, it will not be possible to decontaminate large numbers of vehicles in a reasonable time span. Decontamination or refusal of use should thus be restricted to exceptionally high contaminations that may induce intolerable increases of radiation risks to individuals. Such contaminations are in turn very unlikely.

- **Safety and security in the evacuation zone**

Apart from arrangements to move the affected population safely out of the evacuation zone, additional provisions have to be made, including

- provisions to safely shut down businesses and industries in the planning zones,
- provisions for special facilities that need to be staffed,
- provisions for pets and livestock left behind,
- pre-arrangements with respect to people who cannot be evacuated or who refuse to evacuate (notification of emergency, advice, safety and security rules and control),
- pre-arrangements for the security of property in evacuated areas (e.g. access control, regular patrols etc.).

- **Safety of emergency workers**

Safety of emergency workers in the course of an evacuation is a key issue, not only because they need to be protected against all kinds of hazards in order to carry out their tasks but also their performance will expectably depend on the level of confidence in their own safety. Protection against radiological and non-radiological hazards should thus be included in the planning by

- taking into consideration the applicable dose limits and reference levels for emergency workers in task planning,
- planning and providing adequate means for radiological monitoring and personal gear for radiological protection,
- determination of suitable locations for sheltering, examination and decontamination of emergency workers,
- identifying non-radiological hazards specific to the emergency workers during evacuation and adequate prevention means,
- instruction of emergency workers about the radiological and other hazards and how to protect against them,
- prepared information for briefing emergency workers before action,
- Personal dose monitoring and medical surveillance of high exposed emergency workers.

- **Exercising**

The evacuation plan should be regularly exercised by the authorities involved. As full-scale exercises are difficult to be carried out and may impose unacceptable hazards, the plan could be exercised by sub-units and by tabletop exercises.

- **Revision and updating**

The evacuation plan should be regularly revised and updated. Relevant changes which are expected during its validity period (e.g. demographic developments, changes in infrastructure) should be included in the establishment and revision process.

- **Stakeholder involvement**

Stakeholders should be included in planning, updating and regular exercising of evacuation plans but also in real emergencies, as they play a vital role for public acceptance of countermeasures in case of an emergency. Concerning stakeholder involvement the authorities should consider the following steps:

- Identify stakeholders (e.g. interest groups, aid organizations, environmental groups, local media etc.),
- Familiarize with different opinions and needs,
- Evaluate and discuss possibilities for co-operation in emergency preparedness,
- Stipulate arrangements for communication in case of an emergency (partners, rules, means),
- Support and encourage stakeholder participation in exercises,
- allocate possible roles and responsibilities for the case of an evacuation,
- Stakeholders support in the implementation of evacuations in the case of an emergency, according to the preallocated roles and responsibilities.

5.2.2 Instructions for population

Preparatory information for the population around nuclear facilities about what to do in case of an emergency is state of the art in emergency preparedness, required by EC regulations and usually mandatory by national legislation. Evacuation is part of the information required in corresponding information material and should be treated together with sheltering and thyroid blockade.

Information should contain explanation in what kind of situations evacuation could be necessary, description of responsible authorities and a short summary of provisions. Practical advice should be given about what to do if an evacuation is declared (cf. paragraph 0).

The information material should also contain maps of the evacuation planning zones including plans of foreseen evacuation routes together with lists of collection points and -if available- accommodating municipalities and selected locations of emergency care centres outside the evacuation planning zone.

5.3 During intervention

5.3.1 Tasks of the authorities

- **Decision**

Decision about evacuation is time-critical. Decision should be based on reliable and timely information.

Basis for decision

In the pre-release phase, decision should take in to account

- the current status of the facility (activity inventory, challenges to barriers, expected development of status, probability, expected magnitude and time of a release),
- expected effort and adverse effects of evacuation of endangered areas where reference levels are expected to be exceeded,
- current situation and expected development of the meteorological situation,
- expected efficiency and perspectives for completion before release of radioactivity,
- expected efficiency and possible adverse effects of alternative countermeasures,
- availability of resources and infrastructure according to the evacuation plan.

During or after a release, available information on released activity and the composition of radionuclides should be taken into consideration. Efficiency should be evaluated taking into account the averted dose by the countermeasure in comparison to the dose already received and the additionally expected dose caused by implementing the countermeasure itself.

Content of decision

The decision to evacuate must clearly inform about its reasons, its objectives, and the planned actions by the authorities. Furthermore, advice to the individuals affected should be included. The decision should thus include:

- justification and objective,
- strategy of evacuation (e.g. staggered or simultaneous),
- determination of the area(s) and parts of the population to be evacuated,
- instructions to persons to be evacuated (cf. subsection 5.3.2),
- determination of evacuation routes and transport means,
- determination of safe accommodation areas, registry and distribution of evacuees,
- determination of emergency care centres,
- time schedule for evacuation actions.

- **Information of the public**

If it is decided to evacuate during an emergency situation, the authorities have to check the actual applicability of and, if necessary, adopt the evacuation plan to the actual situation. All activities should be carried out according to the evacuation plan unless deviations are absolutely unavoidable for successful implementation. The latter exception would have to be explicitly decided and timely and understandably communicated to all forces in charge by the central command structure.

Like for other countermeasures, some basic items are of importance for the authorities:

- Evacuation (incl. starting time and duration) has to be communicated as early as possible in order to give people enough time to implement the measure.
- The authorities have to stay in contact with the emergency task forces deployed in the field and to guide the staff efficiently during an accident.

- The authorities are obliged to stay in contact with the public affected by this protective action and provide them with all relevant information. The information should be distributed over all possible information pathways like radio, TV, internet etc. The public should be requested to listen to information on the radiological situation and to recommendations.
- The authorities have to establish an information centre where people can call and get urgent information, advices, help etc. The staff should be trained to talk to concerned people. This means psychological experiences should be available.
- The public has to be informed periodically about the situation in the facility, especially if a major release is imminent or already ongoing. In such a situation, people should be informed not to go outside except in case of a medical emergency.

5.3.2 Instructions to be given to the public

The following general instructions, which are already content of the preparatory material, should be adopted to the situation and repeated:

- Unless other instructions are given, shelter and listen to advice by authorities by radio, TV, internet, broadcasting by police and fire fighters etc. – keep telephone lines free for emergency communication.
- Consider who in the neighbourhood (e.g. elder, sick or handicapped people, children not accompanied by parents etc.) possible missed the information about evacuation decision, inform and support them.
- Take an emergency pack for each person in the household with clothing, medicine, documents etc. for about 2-3 days.
- Household or business places have to be secured for absence (switch off electrical devices, water and gas taps, extinguish fires, lock doors and windows).
- Make provisions for animals which have to be left. Shelter them in closed places, leave sufficient food and water. Mark premises where animals are gathered so that emergency workers will find them to take care if necessary.
- If private cars are used for leaving the endangered area, shelter together with those who intend to leave the area together by car and find out whether other people from the neighbourhood need to be taken, wait for the information by authorities when to leave and which route to take. Follow the instructions and traffic control orders by the authorities and do not deviate from the determined evacuation route.
- If public transport is needed to leave the area, go to the nearest collecting point when being told so.
- Seek for assistance by neighbours or public services if you cannot reach a collecting point by yourself. Locations where people stay who cannot leave by their own forces should be clearly marked for the emergency services.
- After having reached the accommodation area, please register. If you are not sure whether you have been exposed or if authorities advise you to do so, seek assistance for radiological survey and, if necessary, decontamination at the nearest emergency care centre.
- Special instructions have to be given to schools and nurseries. In particular, the school staff must be informed about feasible communication channels with parents and possibilities to get supplies for eating, drinking and accommodation as well as medical

support for children in need. Advice on how to carry out the duties for supervision and care in case of an evacuation situation including the following stay in accommodation facilities together with instructions on how to deal with children and/or parents who deny following the evacuation should be given.

Messages should also include warnings to follow strictly the instructions and not to evacuate on one's own initiative in order to prevent uncontrolled escape movements and panic reactions.

5.3.3 Information for people who will be evacuated

Information should be based on prepared messages. Like for other countermeasures, the cause for the decision to evacuate should be explained. Messages should be kept simple and clearly inform about

- where to stay before withdrawal (e.g. shelter in place, go home, go immediately to a point to be picked up),
- which time is available to prepare yourself,
- when to leave the area,
- what to take with you,
- which transport means or route to take and where to go,
- whom to address to for registration, accommodation and other needs after leaving the evacuation zone.

6 End (or prolongation) of evacuation ("When and how should evacuation be lifted or extended?")

The management of return or transition to relocation is by itself a complex task. It is not part of the time-critical decisions to take before and during an evacuation and should be based on reliable and complete information about the radiological situation inside and outside the evacuated area. Three principal alternatives of transition from an evacuation can be distinguished from the radiological point of view:

1. *Return to the evacuation area without restrictions on individual life:* Radiation levels and contamination values of surfaces, food and feedstuff are low enough so that life in the evacuation area can be continue without any restrictions on behaviour and use of food and feedstuff. Radiation monitoring of the environment should be continued to confirm that the radiological situation does not provide an enhanced risk.
2. *Return to the evacuation area with restrictions on individual life:* Radiation levels are low enough for staying and moving around in the evacuation area without restrictions. However, contamination values for certain food or feedstuff and/or soils or surfaces may imply restrictions of the use of land and water resources as well as leisure activities or the possibilities for children to play outside in certain areas and. Cleanup of hot spots in public places, exchange of surfaces of playgrounds etc. may be a prerequisite for returning. Continued monitoring of surfaces, food and feedstuff is required to grant radiological safety establish a common understanding about the presence and absence of radiological risks.
3. *Transition to relocation:* Radiation levels in the area are so high that staying or moving around in the area without time restrictions would bring about a significantly enhanced radiological risk. This always holds when the reference levels for relocation are

expected to be exceeded. Provisions for evacuees to continue their life outside the evacuation zone (either temporarily or permanently) have to be taken in this case.

Even if the reference levels for relocation are not expected to be exceeded, alternative 2 or 3 might have to be considered. Factors which relate to the choice of decisions to keep the dose as low as reasonably achievable include:

- The received and the projected doses,
- The social acceptability of the evacuation with increasing duration (situation in accommodation facilities, acceptance of evacuees in receiving areas, stress for dislocated persons and torn –up families…),
- Perspectives for re-establishment of non-radiological safety, civil control and a working infrastructure for provision with daily needs in the evacuation zone,
- To gain/maintain the credibility of the public.

In the post-evacuation management, it also has to be taken into account that people may wish to continue their life outside the evacuation zone rather than accept restrictions on individual behaviour or live with the scare of exposure even if the actual radiological situation does not provide an enhanced risk. Other people may insist on returning even if relocation is implemented.

7 Limitations and complications; risk/benefit considerations

If carried out in time before any release, evacuation is the most efficient countermeasure because any exposure is avoided and evacuees are safe from unforeseeable further developments in the endangered area.

- **Possible adverse side effects of evacuation**

Evacuation is a disruptive countermeasure. It can provoke both short term as well as long term adverse effects. Examples for potential short-term adverse effects to the population and economics are:

- Families may be separated,
- Traffic jams, accidents,
- Facilities have to be shut down,
- Sick and elderly people may suffer health problems,
- psychological problems to people,
- Special difficulties to evacute patients from hospitals, homes for elderly people, nurseries etc.

Examples for potential medium-term to long-term adverse effects to the population and economics are:

- Special safety and security risks for property,
- Disruption of socio-economic life,
- Economic damage to enterprises in the evacuation area,

- Loss of income for evacuees, increasing economical and social difficulties,
- Personal feeling of insecurity for the future,
- Social problems with population in reception areas.

- **Possible difficulties for the implementation of evacuation**

Several difficulties may arise before or during the implementation of an evacuation which are delaying or even making an evacuation impossible. For example:

- lack of time in order to guarantee a safe evacuation,
- Bad environmental conditions such as bad weather conditions,
- lack of transport capabilities,
- uncontrolled self-evacuation in areas, where no evacuation is foreseen; blocking of the regular evacuation.

8 Linked actions

Evacuation will be accompanied by additional measures and recommendations, for example:

- Sheltering has to be considered in a wider area.
- Thyroid blocking has to be considered.
- Access control to areas of concern.
- Traffic has to be regulated.
- Warnings against consumption of food and feed which might be contaminated in the wider area will have to be considered. The population is strongly advised not to consume fresh vegetables, fruits, meat and milk. The authority will give further information on food restriction as soon as corresponding measurements are available.
- Agricultural countermeasures and other food chain protective actions to prevent contamination have to be taken into consideration.

Linked actions specific to evacuation consist of the establishment of emergency care centres (ECC) for evacuees and their belongings within the predetermined accommodation areas (c.f. subsection 5.2.1).

Practicability of protective actions: Thyroid blocking

Contents

1 Exposure pathways

Only the exposure pathway of inhalation will be taken into account for two reasons: It is recommended to ban food and the derived emergency reference levels for iodine in food prevent ingestion doses which makes thyroid blocking necessary.

2. Dosage and intake

2.1 Amount of intake dependent on the age

For the majority of the participating countries the amount of intake of iodine mainly is in line with the WHO recommendations. Deviations on one hand result from a finer age grid, in another case from the intention of a lower number of age groups or additional upper limits.

The working group agrees on the following age groups and dosage :

Age group	Daily intake – mg iodine	Daily intake – mg KI	Tablets à 65 mg KI
< 1 month	**12.5**	**16.25**	**1/4**
1 – 36 months	**25**	**32.5**	**1/2**
3 – 12 years	**50**	**65**	**1**
> 12 years	**100**	**130**	**2**

Table 1: Dosage of iodine for different age groups

The newborn should have its own dose in addition to breast feeding in order to guarantee a sufficient level of protection. A single dose is considered important to start the protection. It is, however, also stressed that care should be taken for a correct dosage to the newborn to reduce any risk to the child.

2.2 Multiple intake

Additional daily intakes might be necessary when the enhanced iodine concentration in air lasts longer than 24 hours. Due to the limited duration of protection by a single intake, a second intake of iodine might be appropriate to extend efficient protection, but this may also enhance the risk of side effects. The issue of prolonged intake and of a potentially necessary limitation of the intake to avoid side effects was discussed. It seems that side effects due to prolonged intake are not yet really understood, so a general decision cannot be taken with respect to this issue.

2.3 Time and duration of intake

The working group discussed the efficiency of the blockade of the thyroid as a function of time according to the graph in annex 3. As a general consideration, the best time for the intake would be up to a couple of hours in advance of the arrival of airborne iodine. The time needed to sufficiently block the thyroid is about 30 min after oral intake of tablets and a little bit shorter for liquids. After a single intake, the protection of the thyroid will last about 24 hours. Newborns and pregnant women are recommended to receive only a single dosage of stable iodine for thyroid blocking.

Consequently the working group recommends that iodine tablets should be taken up to a couple of hours before the iodine activity increases in air. A good dose reduction can be achieved when stable iodine is administered up to 10 hours before and up to 2 hours after the beginning of radioiodine inhalation.

Furthermore it is stated that a limited protection due to late intake of stable iodine is better than no intake, as even a later intake of tablets supports a more rapid exchange of iodine in the thyroid over a time span of 1 to 2 days.

2.4. Contraindication

Major side effects exist causing a contraindication but are extremely rare and therefore do not pose a major risk to the general public. This is particularly true for a single administration. Alternatives for iodine to avoid contraindication do exist, but also may have their own side effects. It is considered necessary that people who may be sensitive to iodine should contact their doctor to decide on possible alternatives. The working group recognised that basically this issue seems to be a problem to inform people on details of the effects of this countermeasure and on the possibility to check for iodine sensitivities.

The working group recommends to inform the public on the physiology of thyroid blocking and on potential side effects. Pre-distribution gives a better chance to inform the public, to trigger a check for contraindication and to ask the doctor for advice.

4. Physical and chemical requirements

4.1 Form of iodine for thyroid blocking

Iodine tablets are best suited for predistribution. Also during an accident tablets can be more easily distributed than liquids. Nevertheless good experiences have been gained in Poland after Chernobyl when iodine was applied in liquid form. The liquid form is also applied to children in hospital in the UK.

4.2 Long term stability

The long term stability of tablets was discussed considering the experience gained on this issue. The working group expects that the package of iodine tables (iodate and iodine) has to guarantee safety against hazardous influences especially oxygen, humidity and light . Storage conditions need to avoid heat influence.

4.3 Amount of iodine per tablet and physical properties of the tablets

Tablets with 50 mg iodine should be applied as a standard to ease fractionating for children and newborn.(50 mg iodine => 65 mg KI => 138 mg iodate). For easy and precise fractionating the tablets should not be divided into more than 4 pieces. It is important to find ways to administer iodine easily to children, especially as the tablets are not easily soluble and children dislike their taste. It is recommended to crush the piece of the tablet and to disperse the powder in milk, water or tea with a good tasting flavour. The working group suggests considering paediatric forms of iodine specially designed for children. (see table 1)

The replacement of tablets by liquid forms is an alternative for children

5. Stockpiling

Regarding stockpiling, different alternatives and options are possible: storing of tablets, powder and liquids. For supporting people in the nearer vicinity of the plant several small stockpiles in

pharmacies or public institutions are favourable while for greater distances to the plant central stockpiles might be sufficient. The condition for storage are the same as discussed under long term stability.

An option might be the concept of transboundary solidarity and mutual assistance between neighbouring states on the basis of assistance convention treaties. The working group recommends to consider assistance and support by other states. However, it is indispensable for each state to have of an own stockpile. But the total amount might be harmonised.

6. Pre-distribution

Pre-distribution is recommended to be applied in the EPZ of each nuclear installation with a relevant inventory of radioiodine.

6.1 Advantages

Pre-distribution is preferred because the tablets are directly available in an event and there will be no conflict other countermeasures, especially sheltering.

When tablets are pre-distributed additional information can be provided. This information should cover the mode of protection as well as practical guidance e.g. where to store the tablets.

Pre-distribution gives the opportunity to involve the concerned population in emergency preparedness.

Preparing and implementing pre-distribution provides an opportunity to obtain additional information about the population characteristics which is of interest for planning other countermeasures.

6.2 Disadvantages

On the other hand experience shows that tablets get lost or cannot be found in an event. Therefore provisions for additional distribution in an accident are usually necessary.

Furthermore tablets have to be replaced after 10 years when the expiry date has been reached. (In stockpiles it is possible to prolong the validity by physical-chemical investigations into the stability of the tablets.)

In case of voluntary pick up of the tablets, 100 % coverage will not be reached.

6.3 Planning of pre-distribution

Some practical aspects have to be kept in mind, when thyroid blocking is planned.

- A timely availability of iodine tablets has to be assured by appropriate distribution concepts, in the vicinity of a nuclear installation with a large inventory of radioiodine.
- Planning distances for pre-distribution depend on several parameters and assumptions as e. g. size of the facilities , radionuclide inventory, scenario, locality. Many countries use the emergency planning zone (EPZ) as an orientation for planning of countermeasures including thyroid blocking.

- Public institutions like nurseries or schools should be supported with a stockpile of tablets.
- For pre-distribution medical legal boundary conditions prescribe distribution via chemist's shops (drugstore, pharmacies); exceptions can be found in France, Belgium and Switzerland.
- For (local/regional) stockpiling at special centres, e. g. school, drugstores, town halls will be used. For larger distances, decentralised storages are applied.
- For 20 km to 30 km distances, storages with distribution on demand by army or civil service are installed.
- It is important to plan the transport and the distribution of stable iodine carefully.
- Information to the intake of iodine should be given in clear and simple language which is understandable for normal people. *It is not sufficient to add a medical information leaflet to the iodine tablet*s.
- In order to facilitate an easier extension of the validity of the tablets, only the production date should be indicated on the packages. The extension of the validity beyond 10 years should be reconfirmed by annual inspections.

As an additional supporting measure the working group suggests to support an international experience exchange using also the results of exercises to be performed; authorities need to concentrate on the superposition of countermeasures and the associated consequences for planning and preparation (taking shelter, need of drinking water, location of storage of tablets, fetching and taking tablets etc.)

7. Distribution in an event

The working group agrees that the sole distribution during an event is not recommended for the EPZ but useful for areas further away from the source.

7.1 Advantages

As rapid releases are unlikely in nuclear facilities with containments, a period of 24 h is sufficient for distribution of stable iodine. When information on the weather within the next days are available, the areas for distribution can be identified more precisely, which reduces the number of tablets to be distributed especially outside EPZ significantly.

Non pre-distribution has the advantage that tablets are under control, this gives the possibility to prolong the validity date.

7.2 Disadvantages

The logistic effort necessary will be enormous and to cover all areas of interest right in time. It might be that iodine does not reach the affected people in time.

7.3 Planning of distribution in an event

The authorities have to make sure that iodine tablets are transported to affected areas and distributed there within a certain time (e.g. 12 h). The logistic effort necessary will be enormous to cover all areas of interest right in time. Therefore the transport and the distribution have to be planned carefully in advance. Unfavourable conditions like adverse weather, traffic jams etc. have to be taken into account.

During the passing of the cloud, distribution of stable iodine tablets by emergency workers can go on as long as the external radiation is acceptably low and personnel is adequately protected. Priority should be given to kindergartens, schools etc. When no tablets are available, sheltering still may be suitable to provide a certain reduction of the thyroid dose.

8. Linked actions

As soon as thyroid blocking has to be introduced, food ban/agricultural measures and sheltering are additional relevant measures. Regarding the vice versa combination, sheltering and food ban would not automatically require thyroid blocking in addition.

For the newborn and pregnant women, evacuation has to be considered within 24 hours because only a single administration of stable iodine is appropriate for these subgroups.

When people are evacuated right in time before exposure thyroid blocking is not necessary. But it has to be introduced when early evacuation fails in the vicinity of nuclear installation with high inventory of radioiodine.

Nevertheless case-by-case studies have to be carried out to identify the adequate combination of countermeasures dependent on the distance to the source. It has to be ensured, that important parameters and restrictions (duration of release and countermeasure, restrictions to countermeasures, endangering of staff) are considered in the decisions.

9. Communication

9.1 Information and Instructions

The working group has addressed the field of information and instructions under several topics above. This field does not only cover the information transfer between all relevant partners of the authorities and task forces, but also the communication and instructions to the public. The information must enable people to understand the measures implemented and to follow the announcements and instructions of the authorities correctly and with responsibility.

The competent authorities must assure that information transfer between the authorities and task forces in charge and the public are well prepared. Information and instruction have to be formulated in simple and clear language that they are easy to understand and not misleading:

A comprehensive information transfer between all levels of the task forces is needed as well as information on countermeasures potentially implemented.

9.2 Leaflet – content

Leaflets are one of the basic information when the intake of stable iodine is introduced. Some leaflets tend to be very formal and may not contain information that may be understandable, interesting or even important for the public.

Leaflets have to explain the basic mechanism of thyroid blocking in an easy understandable way. It has to give practical guidance for the intake, especially for infants. In the case of pre-distribution qualified information will be necessary on possible side effects and how to store tablets to retrieve them easily. For special target groups as e. g. schools, nursery additional information may be necessary. Harmonisation of leaflets between countries is recommended.

Under these aspects the group considers the leaflet developed by 5 European countries as well suitable for information of the public. (see annex 1)

Annex 1 - Leaflets have to explain the basic mechanism of thyroid blocking

En cas d'accident nucléaire

Dès l'alerte, il faut :

- rentrer chez soi ou rester à l'intérieur d'un bâtiment,
- écouter la radio et suivre les consignes du préfet,
- garder les comprimés d'iode à portée de main, le préfet peut vous recommander d'en absorber.

En cas d'accident nucléaire, des rejets d'iodes radioactifs dans l'air peuvent se produire.

L'iode radioactif porte atteinte à la santé de la population, en particulier des plus jeunes.

Les comprimés d'iodure de potassium protègent la glande thyroïde contre les effets de l'iode radioactif.

Pour en savoir plus :
www.asn.fr

Septembre 2007

asn AUTORITÉ DE SÛRETÉ NUCLÉAIRE
www.asn.fr

Utilisation des comprimés d'iode en cas d'accident nucléaire

Mode d'emploi

Les comprimés d'iode sont efficaces durant 24 heures.

Le comprimé se prend dissous dans une boisson (eau, lait, jus de fruits).

Dissoudre le comprimé dans un peu d'eau.

Verser le mélange dans une boisson.

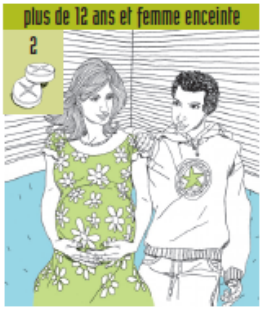
Le comprimé d'iode est un médicament, lisez attentivement la notice avant de l'absorber.

0 à 1 mois — 1/4

3 à 12 ans — 1

1 mois à 3 ans — 1/2

plus de 12 ans et femme enceinte — 2



En cas d'accident nucléaire, le comprimé d'iode doit être pris sur instruction du préfet.